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GENERAL INDEX.

Agriculture.

CULTIVATION OF THE POTATO (CONTINUED).

BY THE EDITOR.

CROSS FERTILISATION.

Mr. Findlay, the celebrated raiser of so many new varieties of potatoes, in the course of a lecture before the Glasgow and West of Scotland Agricultural Discussion Society, spoke as follows on cross-fertilising and raising new varieties from seed:—

In the first place, I am distinctly of opinion that natural cross-fertilisation never took place in any part of the world at any period of the world's history. The blossom of the potato has a faintly sweet smell, yet it secretes no honey or nectar, and the pollen seems to be a bit too sharp and tasty to suit the palate of even the most voracious insect. In fact, it is highly poisonous, and I daresay that is where their objection comes in. I have seen now and again a bumble bee, no doubt attracted by the sweet smell of the blossom, alight on the edge of the petal, but never saw one explore the bloom, as is their habit where they expect to find either nectar or pollen. As the most casual observer will have noticed, the potato is an early closer, shutting up its blossoms between 2 and 3 o'clock in the afternoon, and, by reason of a certain twisting process, puts it out of the power of any nocturnal moth or other insect to gain access to either nectar or pollen, even though they both were there. In the second place, I hold it it is utterly impossible for the pollen of one blossom to be wind-borne, and so fertilise another, even on the same plant, one reason being that it is too heavy, and another, and more important one, being that it is a bi-sexual plant. Both the sexual organs are in the same bloom, the anthers or pollen cases being the male parts, and the pistil representing the female. And it further appears to me that, for some reason which I have not been able to discover, the potato plant is by nature opposed to cross-fertilisation, for, immediately the pollen in the anthers is matured, the bloom twists itself up harder than ever round the pistil, and no longer opens out to greet the sun. The bloom then no longer stands erect on its stem, but begins to hang down, swaying in the breeze. The pollen falls down into the narrow space formed by the twisting of the petals, all around the bulbous point of the pistil. The bloom thus remains for the matter of two days, and then falls off. Strange to say, the pistil only absorbs a very limited portion of the pollen. Yet what is left, so far as I have been able to discover, is perfectly inert. The potato, as I have already said, is, in my opinion, opposed to cross-fertilisation.

HOW HE RAISES FROM THE SEED.

Continuing, Mr. Findlay said, dealing with his method of working:—First I get a shallow seed pan, such as gardeners use, attend to the drainage, fill it up, or nearly, with well-decomposed leaf mould, to which has been added a little fine sand. I take a flat piece of wood, and beat it down fairly firm and level, and sow the seeds thinly and evenly over the flat and firm surface. That done, I take and sift, after adding more sand, some more of this leaf mould. The sifting will remove all grit and stones. Now sprinkle a small portion over the seeds, but see that you do it evenly and not over-thick—as near to an eighth of an inch as you can; give also a slight beat down. If the mould is fairly moist, you need not give any water for at least two days. Set your tray, to be out of the way of mishap, into the sunny corner of a cold frame. Put a piece of old newspaper or other paper over the tray,

covering up with a piece of glass. Your great care now is to see that you do not allow the earth or mould to get dry; at the same time you must guard against making it too wet. In a week or ten days your seed should begin to braird. You must then give them more light and air. With average care, in a very short time you will have nice plants. When about an inch high, put them out in small pots singly. In another three weeks or so, if the weather is suitable, and the season far enough advanced, plant them out in the open where you mean them to be permanently. After this, your work is all in the ordinary course; only, remember this, you must take care when you harvest them to keep the produce of every plant by itself—I mean those you intend to grow again. Fifty per cent. or more will be of no use to go further with; and this 50 per cent. left year by year, you, if wise, will further reduce, until at the end of four years you have only one or two left as the sole representatives of your labour and care.

I am not aware that any attempts have been made by Queensland potato-growers to raise new varieties from seed. The potato plant flowers freely in this State, although the flowers usually drop off before the fruit or "apple" is formed. Where, however, the "fruit" as distinct from the "tuber" comes to maturity, there is no other reason why Australian growers should not evolve a prolific disease-resisting potato equal to some of those lately raised from seed in England and sold at such enormous prices. A correspondent of the "Agricultural Gazette," London, has, through the inquiry column of that journal, elicted the following instructions for raising new varieties from seed:—

Those who desire to produce new varieties of potatoes must first practise the art of cross-fertilisation, and must possess abundant patience. Like many other species which are not habitually multiplied by seed, the potato has a remarkable tendency to revert to the wild form. It may be necessary to cultivate 100 or even 1,000 seedlings, before finding one which is really worthy of a place among the better varieties already existing. M. Vilmorin says that in France the raising of seed potatoes has been proceeded with in a somewhat haphazard manner; whereas in England, on the other hand, a more systematic method has been followed, richness in starch, excellence of flavour, power of resisting disease, with little tendency to develop haulm, being the characters we on this side of the channel generally seek. With regard to cross-fertilisation, it is rather a delicate operation, and needs time and attention to details. Directly the flower begins to open, the anthers must be removed carefully with a pair of fine-pointed scissors. This is necessary to prevent its own pollen from falling on the stigma and self-fertilising the ovary. It is well also to tie a piece of soft muslin round the emasculated flower. You have now to examine the flowers of the other variety which is to act as the male or husband. You may have to examine dozens of flowers before you will find one with its anthers bearing the precious pollen in a powdery form, as some varieties are exceedingly shy pollen-bearers, owing to the energies of the plant being occupied in producing tubers at the expense of full development of its masculine attributes. When you find the pollen dust, collect it carefully on the point of a clean, dry camel-hair brush, and gently brush it on the point of the stigma or female organ that you had previously protected by means of muslin. You must, however, not do this prematurely, but wait till you observe the point of the stigma covered with a viscous-looking fluid. Then, and then only, the stigma is ready for the nuptial rites to be performed. Do not remove the muslin; this will serve to prevent the berry when ripe from falling and scattering its precious seeds. It will easily be ascertained when the berry is ripe, and then the latter should be gathered, placed in a box in a room to become thoroughly dry, after which remove the seeds, place them in a packet, and store them away safely till spring. But, when the seed has been saved after much pains and trouble, it will require some humouring when it is time to sow. Then the seeds should be sown in pans or shallow

boxes 3 in. deep, containing an inch of drainage, then a layer of moss, and sufficient compost, equal parts of light loam and leaf-mould, to fill the box or pan to the top. Press the compost down firmly with a piece of board, and sprinkle some fine sand over it. Sow the seeds thinly, and then cover with an inch of finely sifted mould. The soil must not be too moist or too dry, as the seeds may die in one case or rot in the other. The seedlings should appear in about ten days, and they must have abundance of fresh air. Some writers suggest that the soil should be baked before sugaring it over the seeds, as the damping-off fungus is rather to be dreaded.

JUDGING POTATOES AT SHOWS.

Because a potato has a high-sounding name, and because it is a new variety, judges are satisfied to examine the interior and exterior of the raw potato and award it a prize or disqualify it according as its symmetry and healthy appearance appeal to their judgment. But does this examination satisfy the public? What the farmer wants to know is, its cropping power and its powers of resisting disease, and its early or late appearance on the market. What the housewife wants to know is, what are its cooking properties. It is of little importance that a certain potato exhibit has obtained first prize, for a crop must be a very poor one if, out of 5, 10, or 20 acres a bag or two of tubers cannot be obtained which will satisfy a judge in all that concerns the eye. But there are splendid-looking potatoes which will not stand the cooking test. Some, when cooked, smell of the earth; others show none of that beautiful mealy appearance which is the characteristic of a good cooking potato. One that bursts its jacket when properly cooked, and shows a beautiful dry mealy exudation is surely preferable to one that is soapy or waxy. The market price of potatoes depends largely on the quality of the cooked tuber. At some shows the judges are supplied with a plate of hot cooked potatoes of each variety exhibited, and thus are able to determine what, after all, is the only true test of the value of a potato—its cooking qualities. Size is certainly not everything. It would be a move in the right direction if all potato exhibits at shows were accompanied on judging day by a dish of each variety cooked by an artist—for to cook a potato properly is a work of the culinary art not understood by all cooks.

QUANTITY OF SEED POTATOES REQUIRED TO PLANT AN ACRE OF LAND.

Those farmers who have been planting potatoes year after year do not require to be told how many hundredweights or tons they require to plant a given area, but there are many taking up farming nowadays for the first time, and not being brought up to the business, have very little, if any, idea of the quantities of any kind of seed required per acre for field crops. To such amateur farmers the following advice will be acceptable:—

The quantity required to plant an acre of land with potatoes is, of course, regulated by the size of sets and the distance apart they are planted. There is a great difference of opinion as to the size of sets to use. Generally, when potato-growers are discussing the size of sets to use, if they are asked what weight the sets should be they don't seem to know what is meant. One man says he prefers a good big set, another man prefers a small set—neither man seems to know the weight of the sets he is advocating. It will perhaps be a guide to some growers to know that a potato as large as an egg weighs as much as the egg, and an ordinary hen egg weighs 2 oz. Some growers consider a potato as large as a hen's egg will make two sets—this would be 1 oz. for each set. With potatoes planted 2 ft. from row to row and 1 ft. apart in the rows, it would take 21,780 sets, and the sets weighing 1 oz. each it would take 12 cwt. 0 qr. 17 lb. 4 oz. of seed to plant an acre; this is about the distance apart generally adopted in small gardens. On the farm potatoes would require to be planted about 2 ft. 6 in. by 1 ft.—this would take 9 cwt. 2 qr. 25 lb. of seed; with 1 oz. sets at 2 ft. 6 in. by 1 ft. 3 in. it takes

nearly 8 cwt. of seed. The size of sets is one of the most important things the farmer that has to buy his seed has to consider. Seed potatoes the size of hen eggs are the most economical to buy; each potato will make two sets, and each set will grow as good a plant as a whole potato the size of an egg.

DISEASES OF POTATOES.

It is perhaps not stating too much to say that a very large percentage of disease is due to two specific causes, both of which could be prevented.

Unfortunately, the means of prevention do not generally commend themselves to the majority of Queensland potato-growers. An important fact which has been observed is, that when diseased potatoes are planted, after the crop has been lifted, the remains of the old seed potatoes, when brought to the surface of the ground, will produce a crop of fungus bearing myriads of spores. If such old seed potatoes are kept buried in soil until the following season, and then exposed to light under favourable conditions, fungus fruit is still produced, and continues to grow so long as a scrap of the old potato remains. One often sees in horticultural periodicals statements to the effect that, say, 10 acres of badly diseased potatoes were ploughed in, not being considered worth lifting. Now, in the face of this, it is not difficult to understand where the germs that first infest a crop come from, and with the well-known necessary conditions of moisture and warmth, an epidemic breaks out at once. If the necessary conditions are wanting, however, the fungus, although present, cannot attack the potato leaves; but the absence of disease does not necessarily prove the absence of the fungus, but only the absence of the conditions necessary to enable the fungus to attack its host. In all probability, the fungus is always present in land where potatoes are grown at short intervals, as in this State.

It is just as important to collect the old "sets," or the whole crop of diseased potatoes, as it is to gather the sound ones. "But," says the farmer, "such work would never pay." It might not appear so, but eventually it would more than pay.

A second very fertile source of disease is due to planting infected potatoes. Perhaps no farmer would plant obviously diseased potatoes, but the danger arises when the potatoes exhibit none of the external signs of disease, but, when cut, just show indications of the discoloured patches characteristic of the fungus. The obvious check to this source of danger is to cut all potatoes used for planting, refusing those suspected of being diseased.

POTATO SCAB.

This disease, characterised by the presence of scurvy or scab-like patches on the skin of the potato, is very prevalent during certain seasons; and, although the edible portion of the potato is not injured, the market value is much depreciated. There is also another form of scab superficially resembling the one described, caused by an organism called *Oospora scabies*. The disease is prevented in both cases by steeping seed potatoes for two hours in half a pint of formalin mixed with 15 gallons of water.

Another remedy is said to be efficacious, and that is, to dissolve 2 oz. of corrosive sublimate in 16 gallons of water; when fully dissolved, put the seed potatoes in a bag and immerse them in the mixture, not leaving them to soak, but only long enough to ensure that all the seed is thoroughly wetted. Corrosive sublimate is highly poisonous, and must be handled carefully, a wooden vessel being used to dissolve it in. A potato affection was, in 1899, brought under the notice of the Queensland Department of Agriculture as occurring in the Gramzow and Alberton districts of Beenleigh, and it was found to be identical with the new disease of the potato plant whose nature and cause were first made known in 1894 by Mr. Henry Tryon, Government Entomologist. The disease was probably brought into the Beenleigh district many years since in seed potatoes.

The symptoms of the disease are as follows:—

When the potato plant is in process of vigorous growth, and exhibits every evidence of health, it suddenly commences to droop as if lacking moisture; after a few hours it generally becomes flaccid, its branches bend downwards, and its leaves have their edges turned inwards so as to expose their under surfaces. These events happen in a few hours, and the plant thus smitten never revives, but gradually succumbs. On examination, the roots and tubers will be found, to all appearances, perfectly sound. But careful examination reveals a faint, ring-shaped line, which is seen on the section of a healthy tuber at a short distance within and parallel to the surface. This ring of the healthy tuber is more evident than usual from having become darkened in colour. Later on, an opaque, thick, white, tenacious fluid exudes in minute quantity from the eyes of the tuber; and it is this which causes the earth to strongly adhere to these points when the tuber is taken from the ground and permitted to dry. If kept perfectly dry, the tuber usually undergoes no destructive changes; but if left in the soil, or placed in a damp atmosphere, destructive changes occur, and eventually the whole potato becomes a mere mass of corruption. Mr. Tryon has described minutely the whole course of the disease in the issue of this Journal for July, 1899, to which I refer my readers.

TREATMENT.

As soon as the disease is recognised, every part of the affected plants should be removed, leaving not a particle behind. Then the ground should be opened up and lime applied to kill the plant-microbe. Once the disease has shown itself, potatoes should not be again planted for the succeeding crop on the same land, but two or more crops of, say, maize or brown millet, should be taken off. It should be noted that no plants of the same order should be planted on the infected ground, especially not tomatoes.

THE IMPORTANCE OF SPRAYING POTATOES.

A few experiments conducted by the University College of North Wales in spraying potatoes clearly emphasise the importance of conforming to this modern innovation in farm practice. These trials were carried out on different farms in the counties of Anglesey, Carnarvon, Denbigh, and Flint. In every single instance spraying gave good results, in some cases markedly so. In the matter of marketable potatoes the average in the unsprayed crops was 7 tons 19 cwt. 96 lb. per acre. When sprayed once there was an increase of 1 ton 8 cwt. 91 lb.; sprayed twice, 2 tons 1 cwt. 26 lb.; but the late spraying did not effect such a large increase. There were fewer small potatoes by the use of the sprayer, and less than half the diseased tubers when twice sprayed. The following directions have been issued by Professor Winter, indicating how the operations may be carried out:—

Directions for Spraying Potatoes.

The following dressing is sufficient for 1 acre:—24 lb. sulphate of copper (98 per cent. pure), 30 lb. pure washing soda, 120 gallons of water. Washing soda is recommended in preference to lime. As in practice it will usually be difficult to dissolve the above quantity at one operation, we would suggest that the mixture should be prepared in a wooden vessel which will hold 25 gallons of water. First wash out this vessel thoroughly, and pour into it 15 gallons of clean water; then take 4 lb. sulphate of copper broken to a fine powder; place it in a canvas bag and stir it about in the water until the sulphate of copper is all dissolved. Next dissolve 5 lb. of washing soda in 5 gallons of water in a separate tub; then pour the washing soda solution into the sulphate of copper solution, and stir well. The mixture should then be tested with blue litmus paper; if the litmus is turned red more washing

soda should be dissolved, and steadily added until fresh litmus paper put into the solution remains blue. The quantity of material thus prepared is sufficient for one-sixth of an acre. As the nozzles of spraying machines are easily choked, the mixture should be poured into the machine through a canvas cloth. Spraying should be done twice, three weeks apart.

PREPARATION OF THE SOIL.

In regard to ordinary tillage cultivation, it is indisputable that land intended to bear a good yield can scarcely be brought to too fine a tilth. The rootlets will spread with greater rapidity, and be enabled to take up their nutriment better, if the soil is well pulverised.

If forest land is to be operated on, the first work necessary is, of course, stumping and clearing off the growing timber at least two months before the land is to be broken up. If the soil is black and heavy, as it is in many parts of the State, notably in the Lockyer district and on the Darling Downs, it should be broken up in the autumn, and allowed to lie fallow until the end of June, when it should be harrowed down as fine as possible, and then well rolled. Then the land should be ploughed a second time, crossways, to a depth of 8 in. or more. By so doing the sour soil is turned to the top, and the soil which has been mellowed by sun and rain will be laid under.

Now let the land lie till the end of July. At that time, scarify it with a cultivator, and then give it a final ploughing and harrowing, when it will be in fit condition to be planted in September.

If new scrub land has to be dealt with, when the scrub has been felled and burnt off, the stumps will remain in the ground for some three years, when most of them will have rotted out or can more easily be removed than when they were green. But although the whole of the land is permeated with a network of roots, potatoes may be planted by breaking it up in rows 2 ft. wide with a strong hoe, which easily cuts through the soft roots of the scrub trees. There is no danger in this case of stagnant water collecting in the rows, as the porous scrub soil will drain off the superfluous moisture; hence potatoes can endure far more rain in such soil than if planted on forest land or on black-soil plains.

The season for planting having arrived, the next thing to consider is whether whole potatoes or cut sets should be planted. This will all depend upon the season, whether the autumn or the spring sowing. For the winter crop whole seed is preferable, whilst cut sets are usually planted for the summer crop. I have already given the quantity of seed potatoes required per acre as varying from 8 to 12 cwt., according to circumstances, distance between rows and plants, and the use of whole or cut potatoes being the chief factors determining the quantity needed. When the seed is cut, it is well to sprinkle the sets with dry ashes, which will have the effect of hardening the cut surfaces and preventing the possibility of rotting should the seed lie over long in the ground before coming up. If, however, the seed has been properly sprouted before planting, there is little danger to be apprehended. The seed should be carted to the field in bags and placed at convenient distances along the rows, which are now being drawn to a depth of about 5 to 6 in., at a distance of 2 ft. 6 in. apart. The sets are laid in the furrow at from 12 to 14 in. apart, cut side down. The planted rows may be covered with the harrow.

GROWING POTATOES ON THE SURFACE.

Very good crops of potatoes have been produced without putting the set underground. The tuber itself is not the root of the plant, but merely an excrescence which contains plant food. The roots themselves, which are fibrous and branched, are produced below the tubers; and, provided they

have a suitable soil to enter, the plant will flourish, and tubers will be produced, if certain conditions are observed. The method is as follows:—Break up the soil, and work it down fine, manuring it with stable manure or chemical fertilisers. Plant the sets on the surface, and press them into the soil until half buried, or just cover them with a little light soil; then cover the plot with straw, grass, or similar material to a depth of from 2 to 3 ft., and keep it moist. The potato stems will grow up through the straw, and produce tubers in the lower layers. The straw must be just kept nicely moist. An old method of producing a constant supply of tubers is described as follows:—Place the sets about 6 in. apart each way; build round the plot a pen with rails several inches apart, cover with straw to a depth of 3 ft. or more, and throw over it a few buckets of water occasionally. The tubers produced can be removed as far as the arm will reach through the crevices, from time to time, without seriously disturbing the plants. A large quantity of smooth, clean potatoes of good quality can be raised on a comparatively small area by this means.

GROWING BY IRRIGATION.

Where irrigation is adopted it is possible to ruin a whole crop by unscientific watering. The potato certainly delights in a cool moist soil; but it is one thing to apply the right amount of moisture and another to saturate the soil. As a general rule, the haulms should be allowed to attain a good degree of growth and be well in blossom before water is applied.

Some varieties require more water than others, and, some soils being porous and others retentive, varying quantities of water will be needed. Water applied too soon will often turn the vines yellow, and permanently check their growth. On the other hand, if the ground is very dry at the period when the potatoes are setting, as we term the formation of the young tubers, it often happens that no after application of the water will remedy the matter, and a short crop is the result. When the ground gets very hot and dry, and the vines turn dark-coloured and cease to grow, water becomes necessary at no matter what season, unless the crop has already matured. If the subsoil is lacking in warmth, it will be found fatal to apply water, even if the soil is very dry. One good watering will often mature a crop of potatoes, but, if the growth of vines is heavy and shades the ground well, two or even three waterings will increase the yield, and can, in no ordinary case, injure it. Thorough cultivation should follow each application of water, otherwise the water furrow will dry and cake, and this is most detrimental to the crop. As in the irrigation of other crops, the irrigation furrows should not be too long, because the water takes some time to go through, and the upper end, by the time the lower end has sufficient water, will have had far too much. In sandy soil water may be run for three or four hours, while in tenacious soils the irrigation may continue for eight or ten hours.

There is one very important point to note in connection with potato-growing by irrigation. Once watering has been begun, the ground should never be allowed to become dry. If this is neglected, the growth of the potato stops. Then growth is started again by a succeeding watering, with the result that the tubers will be irregular in size, or a second crop will be set, thus giving a large quantity of small or ill-shaped potatoes. This we have amply proved in a small crop of Sir John Llewellyns and Northern Stars we took up in December. The watering had been done fitfully, the ground being sometimes allowed to become quite dry. The result was that there were large numbers of small Sir Johns besides a second crop just set, whilst the Northern Stars resembled nothing so much as miniature dumb-bells, some taking the form of stumpy carrots. If potatoes are irrigated before the setting of the tubers, a greater number will be formed than the plant can properly support, few of them becoming large enough for market. On the other hand, if

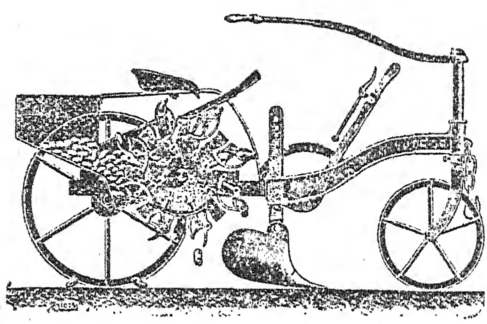
irrigated after the tubers have formed, there will be fewer tubers but a large crop of uniform marketable size. Deep cultivation, and thus keeping the ground mellow, is most important. The field should never be flooded, nor should the water be allowed to reach the crown or stem of the plants. The tuber is not the root of the plant, and it is the roots, not the tubers, which have to be watered. When the plants are 5 or 6 in. high, the roots are several times that length, and no more deep cultivation should be given them. It is sufficient to use some form of cultivation which will keep about 2 in. of the surface thoroughly pulverised.

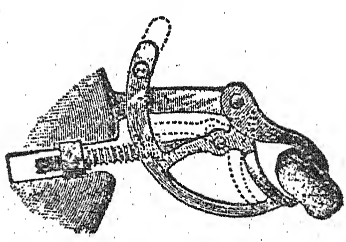
As soon as planting is done, the land having been previously well flooded if the weather is dry, harrow with the row, using bull tongues set to run as deep as possible next the row, the outside ones being set shallow. As the potatoes begin to grow, reverse the shovels, running the outside deep and the inside ones shallow, so as not to disturb the roots. Cultivation should be continued as long as the row can be seen. It should be understood that, with irrigation, the land must be well drained or so porous that the superfluous water can easily escape. Stagnant water is fatal to any crop except rice, and especially fatal to potatoes.

Where irrigation is out of the question owing to want of sufficient water supply or to the undulating nature of the land, deep and constant cultivation and thorough pulverisation of the soil will go far towards making a heavy crop.

POTATO PLANTING MACHINES.

In America and in many parts of Europe, potatoes are now, and have been for some years, planted by machines drawn by horses, which make the drills, drop the sets into them, and cover them. In some machines, the sets are picked up by revolving spikes; in others, there is a finger-and-

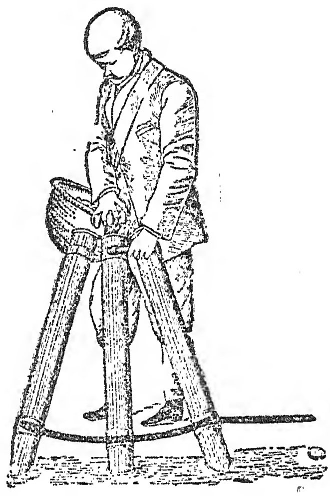




thumb action, which avoids piercing the sets in the hopper. The fingers pick up the potato, hold it as the disc revolves, when a cam opens the fingers, and the potatoes drop into their places as though put in by hand. The machine will plant ordinary seed potatoes with only 5 per cent. of missed plants. The weight of the planter is about 7 cwt.

A HAND PLANTER.

This apparatus was invented in 1902 by the Hon. Cecil Jervis, Nottinghamshire. It is remarkable more for its simplicity than intricacy. The accompanying block shows at once the principle of the implement. By the old system of hand planting, 1 acre a day was very hard work for a man; but, with the Jervis Potato Planter, a man can comfortably plant 2 acres



a day. Emerson says: "There would be more tillers of the soil if the work could be brought breast-high," and the doctrine of the eminent essayist finds practical application in this appliance. Stooping is done away with, uniform work is assured, and the labourer can plant at walking speed. Three potatoes are taken at a time from a hopper slung over the shoulder, and dropped into the planter. The hopper is hollowed on one side to fit the body. The planter deposits the seed with great accuracy.

AFTER CULTIVATION.

Cultivation follows planting very closely, but interference is not needed, if the land is clean, until the haulms begin to show above ground; then it is necessary to run a light, one-horse harrow over them, which can be safely done until the stalks are up some 2 in. above the ground, without any injury to the aftergrowth. This method will save a great deal of labour with the hoe, of which, however, there will be plenty needed beofre the potatoes are fit to hill. The more work that is done among the roots in the way of loosening the soil, either with hoe or scuffler, between the rows, the more likely is the farmer to get a fair return for his labour, provided always that the season be favourable. But even if the weather be dry, cultivation will be a great help to the plants by preventing evaporation of what moisture may be present in the soil. The farmer must, however, be careful to avoid disturbing the plant after the tubers are formed on the rootlets, and, therefore, he should not cultivate too closely.

As the haulms grow higher, fresh soil must be drawn around them; in other words, they must be hilled up as the plants grow. This provides fresh plant food, supports the haulms, and keeps off superabundant moisture.

HARVESTING.

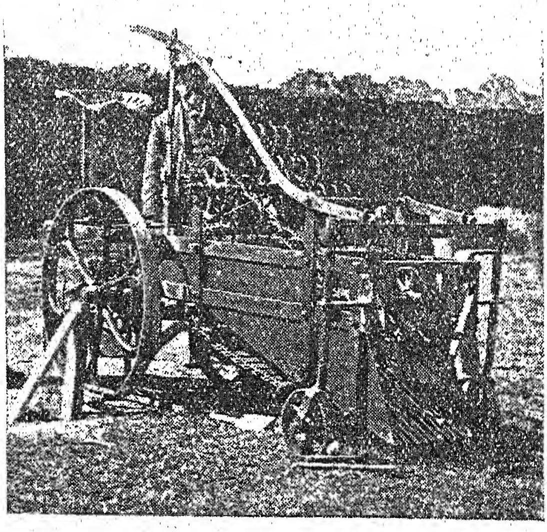
The first thing to make sure of before digging the crop is whether the tubers are sufficiently ripe to be lifted. The surest signs of maturity are the drying off of the haulms, and the firm setting of the potato skin. The winter

crop may safely be left in the ground until the tubers are dead ripe, as there is little fear of any damage being done to them by flies and other insects; but the summer crop runs great risk from the potato fly and from sun heat. It is therefore advisable to take the latter up as soon as the haulms begin to wither and turn brown. The skin will not be so firmly set, and hence the potatoes will have a ragged appearance, and will not keep so well as if they had been allowed to remain in the ground until perfectly ripe.

Potatoes may either be taken up with a digging fork, with a long-handled shovel, with an ordinary plough, with a potato-digging plough, or with the potato-digging machine, of which latter there are several in the market, and two—the Daniels and the Jackson—lately invented and perfected in Queensland by the inventors whose names they bear.

In the early days of potato-growing in the light scrub soils, I found the long-handled shovel a better implement than the fork, no potatoes being left in the ground; the labour also being less back-breaking. One ton a day was a fair day's work with this implement, and none of the potatoes were injured by a tine of the fork being stuck into them. A swing plough will do the work more expeditiously, of course, and without the same risk of damage, but still there is always some damage done by scratching the tubers; and, if the ground is at all weedy, many potatoes will be left behind, which will have to be picked up by hand when cultivating for the succeeding crop.

In the absence of a regular digging machine, perhaps the cleanest way to take up a potato crop is to strip each side of the rows and then run a light plough down their centre, turning up all the potatoes.



The Daniels Machine.

Of the digging machines, the lightest and easiest worked by two horses are the two above mentioned. The Daniels machine, which is manufactured in Melbourne, turns out even the smallest potatoes and grades them, the smallest being thrown to the right and the larger ones to the left, the haulms being thrown clear of the crop. The Jackson machine simply digs the potatoes, but does not grade them. Both machines are equal to digging 5 acres a day.

Where the land is free, and there are no weeds, such as fat-hen and thistles, the machines do excellent work, and are a great saving of labour.

To make the best work, the dry top of haulms and all weeds and rubbish should be removed prior to the machine being put to work. Since the advent of the blight, even if the digging is to be done by hand, it is advisable to clear the "shaws" off, and burn to stop further infection by their coming in contact with the sound tubers after they are brought to the surface. In old times it was customary to make use of the haulms for covering heaps of roots that had to be left in the field over night. But as it is almost impossible to be certain that no small spores of disease are lurking in the haulms, even in what are considered clean crops, it is advisable to run no risks and have the tops destroyed right away, fire being the best thing if the weather will allow.

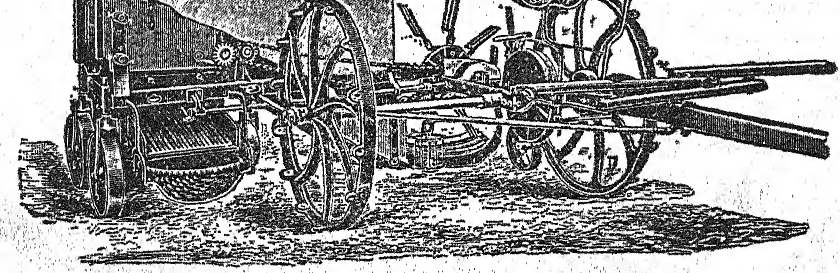
STORING POTATOES.

When handling potatoes for storing, treat them as eggs, careful handling means much as to the keeping qualities of potatoes. When extra labour has to be employed in raising potatoes, the greatest trouble is not slovenly digging; that can be rectified by after cultivation with harrow and plough. After the cleanest of diggers there will be some left, so that it is only a question of a few extra bags to be picked up when ploughing. It is in getting men to sort them as they should be where the trouble lies.

There are several methods in practice in the matter of storing potatoes; one is effected by putting a covering of some 6 in. of straw on a prepared heap of potatoes, and, on the top of the straw, laying another 6 in. of dry earth. But experience has shown that such a covering is too air-tight, causing fermentation and decay. The method I adopted was to place potatoes in a heap upon a high and dry patch of land and cover well with blady grass. By this plan, I succeeded in saving all my seed potatoes in the sixties, at Oxley Creek, when heavy rains culminated in high floods. There is another way, which is to lay them on the barn floor and cover them with straw. This covering, whether out of doors or indoors, is necessary to keep them in serviceable condition. To heap up the summer crop, when first lifted, is a great mistake, as they are sure to heat and decay. In any case, potatoes should not be heaped up whilst in a damp condition, as they will very quickly become valueless. Stored potatoes should be carefully sorted a week or so after they are taken out of the ground.

POTATO GRADER.

The accompanying illustration shows a device for rapidly and easily sorting potatoes as they are taken from the ground. The upper incline has, crosswise, rounded strips with spaces between as a flooring. As the potatoes pass down the incline, the small ones fall through the openings into the lower incline, the large tubers falling into one basket and the smaller into the other. The strips being rounded do not bruise the potatoes.



An English Potato Grader.

A Disease-resisting Potato.

When the new varieties of potato, such as the Northern Star, Sir John Llewellyn, Up to Date, Evergood, and others were placed on the market about five years ago, as absolutely disease-proof, and as being enormously prolific, at exceedingly high prices (as much as £50 being paid for a single tuber), high hopes were entertained that disease in potatoes would be, for a series of years, at least, a memory of the past. But, alas for delusive hopes! Disease became much in evidence, especially in Northern Stars. In 1906, however, at a meeting of the Royal Horticultural Society, Edinburgh, a well-known specialist in potato-breeding exhibited tubers of what is said to be a disease-proof potato. It was not a new variety, rather a very old one, and was supposed to be lost to cultivation; but Mr. T. A. Scarlett discovered it and brought it to light. It is said, in connection with this potato, that there is documentary evidence to show that, though grown since 1745, it has never shown the least sign of disease. It is a black, Scotch kidney, called "Trochie Grant." I have, so far, heard nothing further about this potato, either as to its cropping powers or edible qualities. The colour, of course, is not quite what is wanted in these days; but it is something to hear of a variety that has never been known to take the disease; and, with this potato to work on, hope is given that a disease-resisting variety of modern type may yet be raised. Such a potato would come as a boon to farmers and others who suffer more or less every year with disease in this important crop.

THE CULTIVATION OF SWEET POTATOES.

The sweet potato, so-called, is botanically not related to the English potato, but to the Convolvulaceæ, and is scientifically known as *Convolvulus batata* or *Batata edulis:* also, rarely as *Ipomea batata*. The convolvulus-like flowers frequently produced by the plant often produce seed from which new varieties have been raised. The plant is cultivated in the first instance for the sake of its roots, which often grow to a very large size; and, secondly, for its spreading vines, which, under certain conditions, afford food for stock, although they should be sparingly used for this purpose, since, like sorghum, they contain a certain amount of a poisonous element. The leaves when cooked make a good vegetable, resembling spinach in flavour and appearance. The sweet potato thrives well in all parts of the sea-board of Queensland, and in inland districts where there is suitable soil and a fair rainfall. Extremely moist climates are not favourable to its cultivation, owing to continuous wet weather producing fungoid disease in the roots. Hence, the most suitable districts for the plant are rather the semi-tropical than the tropical. A good rainfall followed by two or three months of dry heat extending with slight rain at long intervals up to the harvest time are the climatic conditions which are most favourable to the sweet potato.

Choice of Soil.

The choice of soil is a matter of great importance. Stiff, wet soils are more injurious to the sweet potato than to the English potato. Clay soils and very rich alluvial soils are also objectionable. On the latter, there will be produced an immense quantity of vines, but very few good tubers, the roots all running out long and thin in all directions. The very best soil is a light sandy loam, not necessarily deep, but loose and dry. Even on pure sand good results have been obtained by the judicious use of manure. A well-cultivated sandy, loamy forest soil is preferable to rich black volcanic, or rich alluvial scrub soils.

The soil chosen, then, should be free, dry, and safe from inundation in time of flood.

PREPARATION OF THE LAND.

The land should be ploughed fairly deeply; and, if the soil be very poor, manure of some kind must be used—a potash and phosphoric acid manure at the rate of 550 lb. per acre. Stable manure, if available, may be used, but it should be supplemented with kainit or, if procurable, wood ashes.

PLANTING.

The rows of furrows should be opened up at a distance of from 3 ft. apart, and well loosened and widened. The manure is then applied, the furrows covered with the plough, and flatly ridged up to a height of 6 or 8 in. The young vine cuttings are then planted on top of the ridges about 18 to 20 in. apart. The cuttings should be from 8 to 12 in. long, and the soil should be well firmed round them. Should the weather be very dry at planting time, it will be found advantageous to dip the cuttings in a thick paste of cowdung and loam.

When vines are unattainable, as sometimes happens when planting in August is intended, small tubers should be procured and planted in a well-prepared bed in May. They will throw up an abundant supply of shoots, which must be covered with grass or litter during the winter months, as the sweet potato vine is very susceptible to frost.

AFTER CULTIVATION.

The next business is to keep down the growth of weeds, which will be very much in evidence in the spring, and these are more deleterious to the sweet potato than to many other crops. As a rule, the weeding should begin when the young plants begin to throw out runners. For this purpose a small harrow or cultivator may be run along the rows, and the weeds on the ridges destroyed with a hoe. At the next cleaning, more hand labour is needed, as the vines will be running vigorously. After this, it is well to draw loose soil round the plants, but without burying any of the vines.

Care must be taken, when using a cultivator, not to disturb the hills or ridges. Many growers run the plough between the rows for a third time, first turning over the vines on to their respective ridges. The half of the soil between the ridges is then turned on to the right-hand ridge and the other half upon the left hand. The vines are then brought to their nautral position, and the crop henceforth needs no more attention.

HARVESTING.

When the roots are ready for harvesting, which should be before the first frosts set in, the digging should only be done during dry weather. The first thing to do is cut away the vines with a sickle or scythe, when the roots may be lifted either with a digging fork or with a specially adapted plough, which is so constructed as to prevent the roots falling back into the furrows. The roots, which are usually free from adhering soil, are then gathered up and carted to the barn.

KEEPING.

If it is intended to keep them for any length of time to await a favourable market or for winter use, they should be pitted with sand. Put down a thick layer of sand either in the barn or in a well-drained spot outside. On this place a layer of tubers, then run in sand until all the crevices are filled up, and the layer is covered. Now lay down another layer of tubers, run in more sand, and repeat the process until as many as may be required are pitted. Then cover with straw or bush hay.

TO ASCERTAIN THE RIPENESS.

When the sweet potato is ripe, the sap has reached what may, with some propriety, be termed the crystallisable stage—*i.e.*, when the root is cut or broken and exposed to the air, a white crust or artificial skin is formed over the cut part, and protects it from the air and from the agencies of decay. If it is not ripe, the cut part turns black, and no such artificial skin is formed. If, therefore, proper judgment is exercised as to the time and manner of digging, handling, and storing, there is little danger of loss.

CHANGE OF PLANTS.

Owing to the constant planting of cuttings from the same stock, sweet potato tubers will deteriorate and become diseased. The grower will, therefore, do well to obtain cuttings or young tubers from another district. Another certain plan of obtaining a clean crop, free from disease, is to grow the plants from seed as has sometimes been done at the Penal Establishment at St. Helena. When the tubers are about to form, a good plan is to twist the vines up in a heap on top of the main stems. It will then be found that the potatoes will at once begin to increase in number and size. One grower says that it does not matter how rich the soil is, providing the tops are twisted.

NON-SETTING OF TUBERS.

It not unfrequently occurs that no tubers, or at any rate only a few, will form. This non-setting may be brought about through various influences; but the most common one is the want of care in selecting cuttings from the most fruitful vines. It is a well-known fact that a cutting will, in almost any case, reproduce the peculiarities of the parent plant; therefore, a crop of tubers cannot be expected from vines taken from an unfruitful parent.

The class of soil has also much to do with the non-tubering trouble. Many soils will produce a good crop of sweet potatoes when newly broken-up, and in a loose, friable condition; but having been under crop for a few years, and becoming, consequently, closer in texture, the results obtained will usually be—plenty of vines and strings, but no tubers.

The best remedy is to obtain some good tubers from a reliable source, preferably from another district. By planting these in a hot-bed, and giving a plentiful supply of water, a number of cuttings would be obtained from the same eye in a very short space of time.

LIABILITY TO DISEASE—THE WEEVIL.

Like most plants the sweet potato is liable to disease and the attacks of insect pests, which affect both vines and tubers.

Of insect pests the worst in Queensland is the sweet potato weevil, which was first noted in Australia in 1886, but whence it arrived here is not known. It was discovered in that year on Mr. A. Miles' farm at Hemmant, near Brisbane. The only remedies which could be suggested by the Government Entomologist were destruction of all affected tubers and a change of crop; but these extreme measures were not adopted. Accordingly, the weevil within the next two years made its way to Woolloongabba, a part of Brisbane itself, and shortly afterwards spread to all the farming districts in the South-eastern part of the State, eventually reaching Bundaberg, Mackay, and all the other Northern sugar-growing districts, utterly destroying the crops.

The damage is noticeable in vines and tubers. The former possess much less foliage than they otherwise should; they are thicker, shorter, and more irregular in growth than in a healthy plant. These thickened stems are found to be hollow and rotten. No tubers are enabled to attain their full development, and they are seen to be pierced with holes, traversed through and through with brown tunnellings, and more or less completely destroyed.

The accompanying plate represents sections of a destroyed tuber, and Fig. 1 shows the rotted stem. The only certain remedy is that already given—viz., complete destruction of the whole crop, and other crops planted instead.

Mr. S. C. Voller, however, says that he found sulphur to be a perfect remedy. He dusted dry sulphur into the crowns or butts of the plants when they began to run, by which means he completely defeated the weevil. A second application might be necessary later on in the season.

POISONOUS PROPERTY OF THE VINES.

Recurring again to the already mentioned poisonous properties of the sweet potato vine, in 1905 several farmers reported serious losses amongst their pigs. In all the cases, the animals had been given sweet potato vines as a portion of their rations. The matter was referred to the Government Analyst, who suggested the possibility of a poisonous glucoside in the vines being the cause of the mortality.

The importance of a closer examination becoming apparent, samples of three different varieties of the sweet potato vine were obtained from the farm of the Agricultural College at Gatton. The analyses of these samples, carried out at the laboratory of the Agricultural Department, proved conclusively the presence of a glucoside, which, on standing for a short time, yields hydrocyanic acid (prussic acid), similar to the poisonous principle found in cassava roots and in the stalks of immature green sorghum.

The following is the result of the analyses:—

	Hydrocyanic Acid. Percentage of Green Substance.
I. *White Maltese*—	
Moisture, 87·4 per cent.; or ·973 grains per lb. of green substance	·0139
II. *Rosella*—	
Moisture, 86·9 per cent.; or 1·113 grains per lb. of green substance	·0159
III. *Spanish Giant*—	
Moisture, 87·0 per cent.; or 1·323 grains per lb. of green substance	·0187

These analyses show that the vines yield as much as 1 gr. of prussic acid per lb. of the green feed, which quantity accounts easily for the sudden death of animals feeding on larger quantities of such food. Boiling the vines, and taking care to pour off the first water in which they were boiled, would considerably lessen the danger.

FOOD VALUE OF SWEET POTATOES.

The food value of the sweet potato will be seen from the following comparative analyses:—

100 lb. of sweet potatoes contain—

Water	69·32 to 73·11	per cent.
Ash	1·09 to 1·29	„
Protein (*i.e*, flesh-forming) material	1·38 to 2·47	„
Fibre	0·86 to 1·23	„
Nitrogen free extract (starch, sugar, gum, &c) ...	29·73 to 28·46	„
Fat	0·43 to 0·85	„

a total of 27·46 to 32·49 of dry matter.

As a comparison, it may be said that 100 lb. maize contain 89·1 dry matter, 10·5 of protein, and 75 lb. nitrogen free extract; while 300 lb. sweet potatoes contain 86·7 lb. dry matter, 4·5 lb. protein, and 75·3 lb nitrogen free extract.

MANURE FOR SWEET POTATOES.

Where the soil on which sweet potatoes are to be grown requires manure, the following mixture will be found to be very efficacious after applying stable manure or ploughing under a green crop:—

90 lb. sulphate of potash 90 lb. high-grade superphosphate 90 lb. Chili saltpetre	per acre.

or, instead of 90 lb. high-grade superphosphate, use 225 lb. superphosphate 16 per cent. Mix well.

THE CULTIVATION OF ARID LANDS.

REPORT BY MR. R. E. SOUTTER, MANAGER OF THE STATE FARM, BUNGEWORGORAI, UPON THE SUB-SURFACE PACKING EXPERIMENTS CARRIED OUT ON HIS FARM.

Though two cereal seasons (1907 and 1908) have elapsed since the inauguration at Bungeworgorai of the experiments with the system of cultivation which necessitates the use of the sub-surface packer, the work may still be stated to be only in the initial stage, owing to the fact that, through various unforeseen circumstances, the results have been unduly influenced, though this season, the third, it is hoped something definite, either for or against, may be arrived at.

In order to make the test as far-reaching as possible, two areas, on totally different classes of soils, were chosen on which to experiment. The first, which hereafter will be called No. 1, being situated on a ridge, with a northerly aspect, containing about 16 acres of sandy clayey loam, with porous, clayey subsoil from 5 in. to 7 in. from the surface. The second block, on the bank of a creek (Bungeworgorai), contained 20 acres of deep brown alluvial soil.

It is hoped in the near future to establish a block on the heavier soils of the plain country, which are nearer the type of those operated on in America.

1907—EXPERIMENTS.

This season was a most desirable one for the testing of the system, being fairly dry. The rainfall registered between sowing and maturing of most of the crops—viz., from 23rd April to the second week in October—was 3·82 in. Owing to the late arrival of the sub-surface packer, due to the fact that one already ordered had been lost at sea, necessitating the cabling for another, the system as laid down could only be partly adhered to. The preparation of the seed bed was carried out as follows, viz.:—

As soon as possible after the 1906 crops were removed, the disc harrow was put to work, which prevented the growth of weeds, loosened the surface, and chopped up the straw sufficiently to enable it to be turned in by the disc plough. This was followed by a ploughing 4 in. deep; disc plough used (set plough advocated), each half-day's work being harrowed before leaving the paddock.

Between the completion of these operations and the arrival of the sub-surface packer (four weeks), the ground was harrowed twice, necessitated by rain being experienced on two occasions.

Upon receipt of the packer, ploughing to the stated depth, 7 in., was carried out where the nature of the soil would permit, each half-day's work being packed and harrowed before the teams left the paddock. The two latter operations were carried out simultaneously with a 4-horse team, by fixing harrows behind the packer.

When all the ground devoted to the experiments had been so treated, each block was subdivided into two equal portions—one to be sown immediately and the other the following season; the latter at that time would then

have, all things being equal, been subjected to all the conditions mentioned as being necessary by the author of the system:—

Results—No. 1.—Crops sown 23rd May; ½ bushel per acre: harvested 6th November; yield, 8·8 bushels per acre.

Results—No. 2.—Crops sown 6th June; ½ bushel per acre; harvested 9th November; yield (average), 7·4 bushels per acre.

The yield on this block was greatly reduced by the trees growing on the adjacent public highway.

Last season's (1908) experiments were rendered absolutely futile by the torrential rains experienced in February and March.

On No. 1 area, a great portion of the surface soil was removed, leaving the clay exposed, which had to be broken up in order to obtain covering for seed; the consequence was that the resulting crop, notwithstanding the splendid season, was very uneven, thin, and gave a very poor yield, and had it been at all dry, no grain would have been garnered.

That this class of soil is not suitable for cultivating under a method which necessitates the fining of the surface soil is elicited by the fact that the adjacent area of the block, which was lying in a rough state, absorbed the rain as quickly as it fell, and did not permit a drop to run off; whereas, as before stated, numerous gullies were made in the former by the running of fine particles together, practically puddling the surface, which prevented the water from percolating, thereby causing it to run.

Results—No. 1.—J. Brown; 3rd May; harvested November, fourth week; yield, 10·3 bushels per acre.

Bunge, No. 1; sown 3rd August; ½ bushel per acre; harvested November, fourth week; yield, 8 bushels per acre.

N.B.—An area of 1 acre sown with this variety of wheat on 4th August, harvested on 27th November, yielded 23 bushels to the acre. The cultivation of this ground was carried out in a similar manner to that under review, with the exception that the sub-surface packer was not used, and it was hoped by so doing to ascertain, when results obtained were compared, the value of the implement to the system; but, owing to the facts already mentioned, nothing in this direction has been accomplished so far, but the work is being proceeded with this season—1909.

No. 2 BLOCK—1908.

The results of the heavy rains proved much more disastrous on this block, as they caused the creek to overflow its banks, and wash a channel about 9 in. deep and 2 chains wide along the whole length of the cultivation. The ill-effects will not be as lasting here as in the other area, but they prevented the ground from being got into a fit condition for seeding.

On comparing notes, it is plainly evident that, as far as we have gone, the soil here requires much more working to keep it in the necessary condition than that operated on in America, due possibly to difference in climatic conditions. On this account, it is quite feasible that the use of the sub-surface packer will be rendered unnecessary by the passing to and fro of teams, which must surely consolidate the sub-surface soil as effectually as the implement. Of course, in districts where the teams have only to pass over the ground three or four times in a season, the implement would most surely prove beneficial, and, again, more so in those where the crops are removed by harvester or stripper.

In order to furnish some idea as to the work necessary here in the carrying out of the system, I might mention that the portion sown last year was not cropped the previous eighteen months; and, in order to keep it in the requisite condition, it was necessary in 1907 to plough twice, 7 in. and 4 in., double disc twice, and harrow five times. Again, in 1908 it was

essential that it should be ploughed twice, 4 in., doubled disked once, and harrowed three times previous to being seeded, and twice afterwards. The cost of preparation alone was about 27s. 6d. per acre.

As previously stated, nothing for the system as a whole can be said, but the results obtained by adopting portions have been so good that, wherever the nature of experiment will permit, they are applied in conjunction with our own methods.

THE PRIMEVAL HOME OF WHEAT.

From the "Nord-Australische Zeitung" of 12th May, we take the following interesting account of the discovery of the original home of the wheat plant by a young scientist named Aaronsohn.

"Hitherto the beginnings and origin of wheat cultivation have been shrouded in darkness, on which no light could be thrown despite numerous hypotheses. In the earliest written records or traditions, wheat is mentioned as something absolutely self-dependent, and the reasons advanced for claiming Syria, Arabia, Central Asia, and China as the primeval habitat of this important economic plant could not stand the test of examination, since, hitherto, no one had succeeded in proving that wheat occurred anywhere in an uncultivated state. A young scientist named Aaronsohn, has now discovered the native land of the wheat plant, and simultaneously the primary home of its cultivation, for he has succeeded in discovering wheat growing in a wild state, from which our numberless varieties of to-day are descended. Aaronsohn found these progenitors of our wheats, as he explained to a fellow-worker on the "Matin," in a conversation with the latter, for the first time in June, 1906, in Upper Galilee, on the mountains of Naphtali, growing amongst jujube trees (*Zizyphus*), almond, and plum trees. A short time afterwards, he discovered, at the foot of Mount Hermon, true fields of this wild wheat, and continuing his researches systematically in 1907, he was in a position to confirm the existence of numerous fields of this primeval wheat in the ancient Moab."

On the signifiance of this confirmation he expressed his views in a detailed statement—

"The varieties of wheat, which we cultivate at the present day, do not thrive without culture and care. Without man's care they would only survive for one or, at the most two years, when they would be destroyed by the wild vegetation. On the other hand, we find a certain variety of wheat, even in the most ancient pile-dwelling situations, including the bronze age."

The scientist expresses himself very hopefully on the possibility of cultivating this wild wheat in countries where hitherto wheat cultivation has not thriven. He says—"The wild varieties of wheat, which I have brought with me from Upper Galilee, thrive there on very stony ground, on the slopes of perfectly arid ranges of hills, parched by the glowing rays of the Eastern sun, where the soil only lies thinly on the rocks, and where no other vegetation occurs. No other plant contents itself with such unfavourable conditions of soil and weather. Yet, in spite of these unfavourable conditions, the wild wheat ripens, producing splendid ears, the grain measuring 11 millimetres (over $\frac{2}{5}$-inch) long; whilst, in comparison, our cultivated grain is only from 5 to 10 millimetres in length. This wild wheat withstands all vicissitudes of the climate; it is found in the deep valleys from 100 to 150 metres (300 to 450 ft.) below the sea-level, in the salty soil of the Jordan district, and also at a height of from 1,000 to 1,600 metres above sea-level, on Mount Hermon, almost reaching to the snow line. In this lies the economic significance of the discovery. By scientific selection and careful treatment, it will, without doubt, be possible to make the experiment of growing this wheat, and to extend its cultivation to those unfruitful regions in which at present wheat culture is impossible. The new variety will prove

especially useful for the land bordering the Sahara desert, for Algeria and Tunis: it could render Syria, Egypt, and Turkestan fertile, as well as some regions of America. Already experiments are being made in America by the United States Department of Agriculture, and in Germany by the Agronomical Institute of Bonn-Poppelsdorf."

If this wild wheat were introduced into Queensland, and "domiciled" by experiments at the State Farms, it seems as if a variety would be evolved which would be able to withstand continuous dry weather in our arid but fertile Western districts. At all events, it would be well to ascertain how some of this wheat is to be obtained. Probably this could be accomplished by communicating with the United States Department of Agriculture at Washington, or with the Agronomic Institute of Bonn-Poppelsdorf, Germany.

[The German article is headed "The Primeval Home of Grain," but as the word "Wheat" is subsequently used, we have taken grain in the sense of wheat.—Ed. "Q.A.J."]

CANADIAN CHAMPIONSHIP WHEAT.

We have received from Messrs. Bulman Bros., Winnipeg, Canada, publishers of "Farm Crops" Magazine, a small sample of Red Fyfe Spring wheat, which won the "Farm Crops" Trophy, emblematic of the championship wheat of Manitoba, in the Sweepstakes competition at the Manitoba Grain Show, held in Winnipeg, 19th to 23rd January, 1909.

The Western portion of Canada, comprising the prairie states of Manitoba, Saskatchewan, and Alberta, is the greatest wheat-growing country in the world. Each year the Provincial Governments of the three provinces hold Seed Fairs throughout the provinces, at which fairs the grain is judged and addresses on seed improvement made. After the local seed fairs have all been held, a Provincial Seed Fair is held, at which all the prize-winning samples of grain from the local fairs are exhibited. To encourage the production of the best seed, and also to create an incentive to exhibit, Messrs. Bulman Bros., the publishers of "Farm Crops" Magazine, donated three "Farm Crops" trophies, to be given for the sweepstakes sample of wheat grown in each province. In addition to the magnificent trophies, which are valued at 100 dollars each Messrs. Bulman Bros. donated 100 dollars in cash prizes in each province to be given as follows:—50 dollars for first, 30 dollars for second, and 20 dollars for third place in sweepstakes competition.

In 1909 the three trophies were won as follows:—

At the Manitoba Seed Fair, held at Manitoba Agricultural College, Winnipeg, 17th to 19th February, Mr. Wm. Reid, Hargrave, Man., won the Manitoba trophy and 50 dollars in cash donated by Messrs. Bulman Bros. This was the highest scoring sample of wheat exhibited in Canada in 1908-09.

At the Saskatchewan Provincial Seed Fair, held in Regina, 19th to 22nd January, Mr. H. H. Thompson, Francis, Sask., won the "Farm Crops" trophy and 50 dollars cash.

At the Alberta Provincial Seed Fair, held in Calgary, Mr. John C. Buckley, Gleichen, Alta., won the premier prize for sweepstakes spring wheat.

The three samples of sweepstakes wheat are the champion samples of Canada. As Canada grows the only No. 1 Hard in the world, these wheats are the champion wheats of the world.

The Manitoba sample is the most perfect sample of wheat of the three. This wheat weighs 65 lb. to the bushel, scored 96½, and is without doubt the finest sample of Red Fyfe wheat in the world.

The sample received has arrived in time to be sown for the coming wheat season, and will be handed to one of the Queensland Experimental Farms for trial.

Dairying.

MILKING MACHINES.

Frequent inquiries reach the Department of Agriculture and Stock respecting the value of milking machines as compared with hand-milking. These machines are not, at present, used to any great extent in Queensland, and where they are in use, many owners have kept no records of the work done by them. Inquiries have also been made as to whether milking machines have any detrimental effect on the milk yields.

In order to gain fuller information on these subjects, the Department communicated with the Departments of Agriculture of New Zealand, New South Wales, and Victoria, as well as with the principal of the Queensland Agricultural College, where milking machines are employed. Replies have now been received from these Departments, to the following effect:—

WELLINGTON, NEW ZEALAND.—Generally speaking, the larger dairy farmers throughout the Dominion are availing themselves of the milking machine, and in the instances where the machines have been installed, farmers, almost without exception, express themselves as entirely satisfied, and they would on no account revert to the old system of hand-milking.

Milking machines can absolutely be recommended where cleanliness is observed, as it is recognised that the machine has no detrimental effect upon the milk yield, but, in cases where cleanliness is not observed, the machine would be a misfortune, as the damaging effect upon the quality of the milk is only too apparent.

(Signed) JOHN D. RITCHIE, Secretary.

Department of Agriculture, Wellington.

MELBOURNE, VICTORIA.—In reply to your letter of 16th March last, inquiring as to the experience of this Department in regard to milking machines, I beg to state that a large number of installations of milking machines was made by dairymen in Victoria. Most of these are still in use and giving satisfaction. Some few, however, are not being used, the owners alleging that the cows went back in the milk yield as compared with hand-milking. Various difficulties have been experienced since their introduction. At one place, the machine was blamed for having conveyed contagious mammitis througout the herd; at another place it was blamed for detrimentally affecting the milk for cheese-making; at a third for giving the milk the flavour of rubber; and at others, for diminishing the milk yield as compared with hand-milking. All these contingencies were anticipated by officers of the Dairy Branch of the Department. The machine, like other mechanical contrivances, has not any brains, nor has it the power to discriminate. The user has to supply these requirements. Every cow should be tested by drawing a few drops from each teat after washing the udder and before attaching the machine. It is also necessary to check the machine by carefully stripping each quarter after the machine is detached. From one cow, only an egg-cup full may be procured, whilst from another in the herd, a tea-cup full may be the result, most of which probably comes from one quarter. When cows have udder affection, they should be left till last, or milked by hand, instead of dipping the teat cups in tepid water, and drawing some through the tubes after milking operations are over, and then hanging up, as was originally recommended by milking machine sellers. It is absolutely essential in addition to take all the parts of the machine, through which milk flows, apart, and wash carefully in the same way as ordinary utensils. The rubber

tubes and taps, through which the milk flows, should be cleansed with special brushes which will go right through, so as to remove all traces of milk, after which, these parts should be submerged in lime water, or other harmless disinfectant, until again required for use. In short, the milking machines are a success in the hands of careful, intelligent users, whilst they may be regarded as a failure in the hands of careless persons.

(Signed) R. G. DUFFUS, Secretary.

Department of Agriculture, Melbourne.

QUEENSLAND AGRICULTURAL COLLEGE, GATTON.—In reply to your letter of 16th March, I beg to furnish the following report on the use of milking machines which have been in use here for the past twelve months:—The machines were, with the exception of one or two occasions, under the control of a careful man, whose duty it was to carefully watch the results, not only while the cows were in actual milk, but also after the animals came in after having been milked for a period with the machines. In no case have I found bad udders or affected teats. I am satisfied that the machines, under the control of a careful person, will do all that is claimed for them. If any faults are to be found, I am satisfied that they may be traced to neglect on the part of the person in charge. To simply attach the machine to the cow, and remove it when you consider she is milked, is bound to result in disappointment, as only a small number of cows will let down their milk, at any rate, until such time as they have become accustomed to the machines, which means but a short time, especially in the case of young cows and heifers. Another noticeable fact is, that, among the twenty cows constantly milked by means of the machines, there has not been one case of sore teats. The machines will not "strip" the cows, which means that the men in charge of the work must do the stripping. In the matter of cleanliness, there is no comparison with the hand-milking, everything being in favour of the machines. The cost of up-keep, such as new rubbers, &c., is small if care be exercised in cleaning and handling same.

I must conclude by stating that I am much in favour of the machines, and, as already stated, when in the hands of a careful person, they have given every satisfaction.

(Signed) JOHN MAHON, Principal.

HAWKESBURY AGRICULTURAL COLLEGE, RICHMOND, NEW SOUTH WALES.—The Principal of the Hawkesbury Agricultural College, Mr. H. W. Potts, reporting in 1902, on the milking machines in use at that institution, stated that after a series of careful comparative tests with two machines installed in that year the results went to prove that:—

(1) There is no loss of butter-fat—on the contrary, a slight increase in the test has been registered. The volume of milk was not diminished.

(2) A series of bacteriological examinations conclusively demonstrated that machine milk is more pure than that taken from the cow. Where special precautions were adopted, the milk was almost sterile—*i.e.*, free from germs. Hence, machine milk will keep longer, is purer, and will make a better quality of butter and cheese. Moreover, the milk thus freed from hostile organisms is more suitable for food for infantile life.

(3) The cost of maintenance is slight, and the saving of labour very great. Two machines will milk 20 cows in 1 hour, and one man can attend to three machines.

(4) The milk flow is simply regulated and maintained much more evenly, and with greater preciseness with the machine than with the hand. The irritating and jerky motions accepted by some milkers with hard, horny, dirty hands are thus avoided.

(5) The machine is of simple design, the manipulation is quickly mastered, and no difficulty is experienced in keeping it clean and in free working order.

(6) There is no objectionable effect yet noted on any cow. Heifers are easily broken in, milk, and strip right out. Aged cows are not so tractable. At first, they require to be hand-stripped, but, after continued use, they also strip right out with the machine. No sore teats, or other source of irritation have been detected.

In a communication received by the Department last month. Mr. Potts affirms all the above conclusions, which are fully borne out by an experience of nearly seven years' constant use of the machines. He concluded by saying:—"They are simple in application, durable, reliable, and practically successful, and will assuredly take the place of hand-milking in all large dairy farms."

DIPPING *v.* SPRAYING.

THE "NATAL" SPRAYING DEVICE.

From the "Natal Agricultural Journal" for December, 1908, we take the following description of an apparatus for spraying cattle and horses, which does away with the expense of the construction of a large dip where only a few cattle are concerned, and also avoids the cost of provision and maintenance of a large quantity of dip fluid—say 2,000 to 3,000 gallons—not to speak of the necessity of frequent renewal, the shock to the system of weakly or pregnant animals, or the drawbacks of driving long distances to a common centre, such as has so often been practised, at present where the system of dipping is employed. Perhaps the chief objection urged against the system of spraying in the past has been, firstly, the necessity of complete wetting of all parts of the beast, and, secondly, the time occupied by the process even when hastily performed. In fact, if these two drawbacks could be removed, the vexed question of dipping *v.* spraying would be relegated to the museum of South African controversies, as drenching *v.* inoculation in lung sickness, or bile *v.* serum in rinderpest, &c. Anything, therefore, which tends to lessen these objections of expenditure of time, or want of thoroughness, will tend to increase the value of the system of spraying, and it is towards the lessening of these objections, and in order to render to every stock farmer a more easily available method of tick destruction, that the present appliance here described has been devised.

With the use of the spray pump for tick destruction we are all familiar, and recently, an American portable appliance for the spraying of cattle while running through a tube or tunnel has been devised, whereby jets of water mixed with oil, are driven into the interior of the tube by a petrol or electric motor pump.

With the merits of the American device, the writer (H. Watkins-Pitchford, F.R.C.V.S., F.R.S.E.) is not able to deal, but reports speak well of its efficiency as a tick destroyer, where the proper grade oil is used for mixing with the water forming the spray or jet.

Though the Natal device, described below, cannot claim the merit of portability, it is simple of construction, and within the reach of stock farmers who are threatened by the disease-producing tick, or are anxious to avoid the constant depletion which stock suffer from simple tick-worry.

In its essential features, the spray-pen consists of a narrow drive or race which—instead of terminating in a deep tank of fluid as in the dip—runs right through into the draining yard or slope on the same floor level. The sides and floor of this run or race are made solid and impervious for about the last 5 yards, and simple bars of wood or iron are slipped through from one side to another to confine one (or two) beasts as they walk through.

Plate III. shows the elevation or side of this pen, which is arranged to take two beasts (one, of course, behind the other, and separated by sliding bars). On the left of the picture is shown a way-through gate, which closes flush with the inner wall of the spray-pen. These gates are also seen in the foreground of Plate IV.

The double pen, as shown, is designed to take two beasts at one time, but where smaller numbers of cattle are to be dealt with, the single pen, or just half that shown in Plate III. is quite sufficient. In Plate IV., although the photograph shows the entire length of two pens, the upper one only is in action, the crossbars making the division between the two. This upper pen also is fitted with the overhead arrangement of pipes, which has been added subsequently to increase the volume of fluid thrown upon the beast. Such addition, however, is not essential.

Upon the sides of the pen, as shown in Plate III., the arrangement of supply pipes is seen. The supply pipe, as it issues from the ground, is 2 in. in diameter, but this is reduced to 1 in. for the spray pipes from which the fluid actually issues, and the pipes are so arranged that an equal pressure is excited by the pump throughout the actual 1-in. spray pipes. Into these inch pipes are screwed the spray-diffusers, each of which can be regulated to deliver, either a jet, or a fine spray of fluid. Eight of these spray-diffusers are carried on each side, four above and four below, and these deliver a fine spray with considerable force. The spray produced by a single spray-pump is familiar to all; this effect is increased sixteen times in the spray-pen when two men are at the pump (as shown in Plate V.). This suffices to surround the beast with a drenching cloud of fluid, saturating the coat in some 10 seconds, but, in order to reinforce the action of these spray-diffusers, the pipe system is continued overhead. These pipes are drilled with a fine drill, so that the issuing jets of fluid are directed in a converging direction, those in front driving down with much force upon the head and ears of the beast, while the rear jets are directed somewhat forward, as shown in Plate V. This arrangement more than suffices for a thorough drenching of the animal, which, literally, "does not know which way to turn," as no amount of turning suffices to avoid the searching effect of the spraying fluid. As it was found, however, that sometimes, parts of the insides of the thighs, udder, &c., still remained dry, a system of floor pipes was put down, two 1-in. pipes running the whole length of the floor and being cemented in, flush with the surface of the same. These pipes were drilled in the same manner as the overhead pipes, but were controlled by a special tap or lever, as it was found that the one pump was insufficient to produce a forcible floor spray when all the the system was open at once (such as is shown in Plate IV.). The floor jets were therefore connected to the pump by a special length of piping, and controlled there by a tap or lever, which is about to be opened by the assistant in Plate V. This lever is generally opened by being pushed down by the foot of the native working on that side of the pump, and the pushing down of this lever suffices to throw the whole weight of the pump upon the two lines of floor jets, with the result that the beast sustains a sudden and unexpected assault from below, and leaves the pen, after a vigorous 20 seconds' bombardment, drenched in every part. After a short time spent upon the draining slope (which is a continuation of the whole ground plan), he is pushed forward into the paved drain-yard, where much of the fluid in his coat finds its way back again down the floor of the pen, and through a fine gauze grating into the small sump or tank, from which it is again drawn by the pump. This small tank is kept full to overflowing, so that the spraying fluid stands some 4 in. above the level of the grating which covers it, and through this shallow bath, all beasts walk when entering the spray-pen. About 150 gallons of fluid is sufficient to fill this receptacle, and to cover the sunken footway to the required depth. As a matter of convenience,

rather than necessity, this small tank can be connected by a pipe with an ordinary 400-gallon tank at ordinary ground level. If this larger tank is filled with 400 gallons of the spray solution (which will be found a convenient amount to handle at one time), the smaller system of the floor of the pen is kept easily supplied to its proper height by the turning on of the tap for a few moments. When operations are finished, a simple adjustment of stop-cocks suffices to pump the whole of the used fluid back into the 400-gallon tank—through another gauze strainer—to serve a similar purpose on many subsequent occasions. In this way, no waste by evaporation, or dilution by rainwater is possible, and the composition of the 400 gallons is kept constant; which latter question of uniformity and constancy of composition is a consideration to which insufficient attention has been given in the past.

The above is, in rough outline, the "Natal" spray-pen. I have not entered here into details of measurements or material, but shall be pleased to give details to anyone who may wish to erect such an appliance. The cost of the spray-pen will naturally vary with the availability of material for walls, posts, &c. Sawn timber is preferable to rough for the latter, but not essential. The walls of the pen could, if desired, be constructed very efficiently of baked brick well tarred, but such essentials as the pump, piping, and cement would, of course, have to be purchased. The average price should not exceed £25 to £35, and for this cost, each homestead not provided already with a dip, could be supplied with an efficient appliance for the cleaning of stock at short intervals.

There is but small room for any part of the apparatus getting out of order. With the exception of an occasional renewal of pump-washers and attention to the small gauze or perforated zinc gratings (which prevent particles being driven into the pipes, so necessitating the pricking out of the sprays and holes), there is no reason why such an apparatus should not work regularly and efficiently for a long time. Renewal of the spraying fluid in the larger tank is necessary, of course, from time to time, but the cost of 400 gallons of efficient spraying fluid is not great, and with average care, this will last for a lengthy period before renewal becomes necessary.

Concerning the exact composition of this fluid, much will depend upon the frequency with which it is desired to apply it. Many of the preparations sold at present for the purpose of tick destruction, are quite efficient when applied at moderate intervals, but disastrous in their effects when used more frequently. With the formula shown below, I have been able to spray a small experimental herd at intervals of five days for as many as twenty-five consecutive sprayings, and they have been maintained in a healthy and tick-free condition during that time, while control animals herded with them have remained grossly infested. Four hundred gallons can be made at the approximate cost of 15s. or less. The spray-pen is as available for the horse as for the ox if it is advisable to spray the former in order to ward off the attack of the tick.

It is thus hoped that, while the two great drawbacks of the spraying system—viz., slowness and inefficiency, can be, in a great measure removed, a stimulus will be given to the more frequent freeing of stock from ticks by a system which, at a very moderate cost, will maintain small herds virtually tick-free.

Formula for Spray Solution for the Natal Spray-pen.

	s.	d.
Soft soap, 5 lb., say at 6d.	2	6
Paraffin, 1 tin, say at	5	0
*Glycerine, 5 lb., say at 10½d	4	6
Arsenite of soda, 12 lb., say at 3d.	3	0
	15	0

* An unrefined glycerine suitable for the purpose can be obtained at 4d. or 5d. per lb.

Dissolve the soap in about 5 gallons of hot water. While still hot, add the paraffin gradually, and beat or stir to a creamy lather.

Add the glycerine with further stirring.

This makes the soap emulsion.

Then dissolve 12 lb. of arsenite of soda in a sufficient quantity of hot water, and, when completely dissolved, add cold water up to about 50 gallons. This can be mixed in the tank. The soap emulsion may then be gradually added and thoroughly stirred while mixing, and water can then be added till the tank is full (400 gallons). This mixture should be stirred before being allowed to flow into the smaller tank when preparing to spray.

OUR DAIRY BUSINESS IN GREAT BRITAIN.

The "Agricultural Gazette of New South Wales," 3rd May, publishes a very interesting account of an interview with Mr. J. F. Pearson, of Messrs. Pearson and Rutter, Limited, one of the largest produce distributing houses in Manchester and Liverpool, who has been visiting the State of New South Wales to investigate the conditions of the produce trade, more especially in butter and cheese, and has called at the Department of Agriculture and expressed his views as follows:—

Mr Pearson is a strong advocate of Government grading of produce exported to the old country, and produces clear evidence that this State (N.S.W.) is suffering in prices by comparison with New Zealand and other Australian States, through the absence of some standard of grading which could be accepted by the big distributing agencies in Great Britain. He says that firms like his own cannot offer New South Wales butter with the same satisfaction and assurance with which they can deal with butter from Victoria and Queensland, more especially the latter State, where the standard is consistent and satisfactory. New Zealand butter, on an average, brings ½d. per lb. more than New South Wales, simply because of the excellent all-round quality, and the confidence in the Government grading which has been engendered throughout the trade in Great Britain. Mr. Pearson insists that the best New South Wales butter is equal to the best from any other part of the British Empire, but there is, unfortunately, a great deal of second and third class butter sent to England, which reduces the average reputation of this State's butter.

He strongly urges that our factories should imitate New Zealand factories in having daily deliveries of milk, and doing the separation themselves, or, in any case, having a daily collection of cream throughout the summer months in order to ensure the quality of the article supplied.

He lays gret stress on the use, in packing, of good material, especially preservative, salt, and parchment paper. He finds that some of the salt used has as much as 2·4 per cent. of impurities, generally earthy matter, which has a most deleterious effect on the butter; whereas, the best Cheshire salt is shown to have as little as ·01 per cent. of impurities. Any factory manager can at once gauge the purity of his salt by examining it with a small glass magnifying twenty times, when he will see that the pure salt consists of clear crystals, perfect cubes in shape, several of them being sometimes joined together, but each a perfect crystalline cube, whereas, in the salt of inferior quality, there are lumps, irregular in shape, though often crystalline in appearance. It is this foreign matter in these irregular crystals which does so much harm to the butter. A common impurity in some of the salt is sulphate of lime (gypsum), which Mr. Pearson asserts can give an inferior flavour to butter originally first class in quality.

Mr. Pearson strongly insists upon the necessity of using nothing but pure water of the best quality, and notes that, in the United States, it is universally considered that water used in the washing of butter should not contain more than ·6 per cent. of foreign matter. It was some time before the butter-makers of the States realised their foolishness in, at the same time, using salt which contained four times as much impurities, but the fact has been driven home to them, and many of them are now importing the best Cheshire salt, although the protective duty in the States makes that article twice as expensive as the home-made salt.

Again, he finds that inferior parchment is used, although the saving may be as little as a farthing on a box of butter, and this occasionally causes spots or mould on the butter, and at all times affects the appearance and selling value of it.

Mr. Pearson speaks highly of certain grades of butter that come from the North Coast, and admits that one brand is so widely and favourably known, that it needs no Government grading, and has, at the same time, nothing to fear from such a policy, because it would always rank as A1; but, "so long as factories making inferior butter can hoodwink their shareholders into believing that their output is first-class quality, when the buying experts know that it is inferior, and pay accordingly, so long will it suit some people to avoid the crucial test."

It is satisfactory to know that Mr. Pearson has a high opinion of the qualification of Australian graders and testers, and generally finds that their judgment is justified after the six weeks' voyage to the old land. There are several little points on which Mr. Pearson lays stress with regard to the matter of grading. "Every man so employed should be a practical butter-maker, and not merely a theorist, who may have learnt his business in college, or even in the butter trade. He should have an intimate acquaintance with the making of butter, so that he can trace the mischief, whenever he detects it, to its true source, and indicate the remedy. The right man can infallibly discover, and point out the cause of the trouble, which, in 99 cases out of 100, is simply dirt, uncleanly methods, or the mixing of inferior cream with the bulk, when such should be thrown away or churned separately."

Mr. Pearson notes with satisfaction the strenuous efforts being made by the authorities in this State to educate the dairy farmers and the younger generation of agricultural students in the principles underlying the making of butter and cheese, so that they are now able to understand and know the reason for every step taken in the process of manufacture, and because of every failure. Mr. Pearson strongly urges that, "all grading should be done privately, without a grader seeing the name of the factory or supplier, and that the grade, whatever it may be, should be stamped on each box, and not merely indicated on the consignment notes or bills of lading. This is a very important point to the distributor, as the retail buyer looks for the grade-mark on the box. By far the greater part of the butter sold is bought confidentially by the retailers, and not inspected at time of purchase. Hence the importance of a reliable standard and grade stamp."

He urges the use of the small amount of preservative (0·5 per cent.) allowed by the British Pure Foods Act, and deems that 0·25 per cent is enough, if the preservative is of first-class quality, and one of the Boron derivatives. He has inspected some of the factories when working in the preservative with salt, and has found that, with efficient working, 0·5 per cent. is ample, about half of it being worked out of the butter, leaving sufficient to keep the latter in excellent condition on the journey. He finds that the slight deterioration on the voyage, which is inevitable in any perishable commodity like butter, is generally found to be fairly uniform, so that, in the great majority of cases, the butter graded as best at this end is still best

at the other end, although not so good to the tester's palate in London as the best Danish, or the best New South Wales butter when tested in the Sydney market.

He lays great stress on the fact that all the defects which now characterise large quantities of our product are remediable, and that fishiness and other serious defects, can be obviated by simple means, generally through cleanliness, both at the dairy farm and at the factory, and daily collection of cream by the factories. In a State where the hand separator is universally used, this daily collection is of the first importance, and its beneficial effect would at once be apparent.

With regard to cheese, he urges caution in making any sudden effort to develop the cheese business, as the trade in that commodity is strictly limited, and cannot be expanded in the same way as the butter trade. He urges cheese-makers to give one month's curing before shipment, and affirms that any good cheese made here in October, and delivered in England from the end of January to the end of March, would meet with a satisfactory market, coming within ¼d. per lb. of the best cheese from Canada, or elsewhere, of similar quality. He would remind cheese-makers that the best size for the British market is a cheese of 70 to 90 lb., preferably about midway between these weights. Smaller cheese are unpopular both with the trade and the consumer.

With regard to the marketing of butter, Mr. Pearson is of opinion that the producer who persistently consigns to the same market during a period of say, 10 years, is just as likely to receive as good an average return as the producer who consistently sells on the Sydney or other local market to the representatives of the many English buyers, who are willing to buy regularly at the full value of the produce, having regard to the probable course of home markets. He does not consider there is much to choose between the two methods, if consistently carried out; but thinks that such a free and open local market is an inestimable advantage to producers.

AVERAGE YIELDS OF THE MILCH COWS OF THE STATES OF VICTORIA, NEW SOUTH WALES, WESTERN AUSTRALIA, AND QUEENSLAND.

REFERENCE TO MILK YIELDS OF DENMARK—AN APPEAL TO THE DAIRY FARMERS OF THIS STATE TO GIVE THE MATTER OF HIGH PRODUCTION FULLER ATTENTION.

By A. E. GRAHAM, Dairy Expert.

In the yields shown below, the average yield was arrived at by dividing the total number of gallons of milk produced by the number of milch cows recorded. The figures are for year ended 1907.

Name of State.	Average Yield per Cow.	Average Test.
New South Wales	257 gallons ...	3·8
Victoria	223 ,, ...	4·0
Queensland	172 ,, ...	3·7
Western Australia	146 ,, ...	Not available.

An attempt was made to obtain South Australian and New Zealand yields, but these were not procurable. In comparing the above Commonwealth yields, it will be seen that this State does not occupy a high postion on the list.

It can be said that a higher percentage of the cows of this State are allowed to keep their calves than in any other portion of the Commonwealth. Such cows are only milked in the mornings and are termed "once a day cows." This practice materially affects the average, therefore Queensland's position is better than at first glance appears.

A somewhat encouraging feature is the steady improvement in this State's milk yields, but in comparison with the average yields of other countries there exists a huge discrepancy and a large gap to fill in.

To do this, the dairy farmer will require to take a lively interest in his herd. He will need to know the exact value of each cow in his "yard," and by systematic weighing and testing of the milk of each cow, be in a position to cull out the faulty animals and gauge the worth of each beast by the actual £ s. d. value of her product.

This may be thought a dreary process and even looked on as superfluous, but I venture to say the benefits gained will more than compensate the dairyman for his trouble.

It is freely admitted there are cows in herds that do not yield sufficient butter-fat to repay for their agistment and trouble of milking. Why keep such animals? There should be no drones allowed in a dairy herd. The presence of unprofitable cows in a dairy herd is doubly dangerous. The trouble does not end with the loss in the milk pail, for generally there is a calf reared annually from these inferior cows, which, if a heifer, will probably later take its place in the dairy herd, and in turn eat into the profits.

The proposals for the establishing of herd-testing associations in some of the more established dairying centres have much to commend them.

The results following the inauguration of similar associations in Denmark have been most satisfactory, and the high milk production of that country is in no small measure due to the existence of such associations.

No truer guide as to their value and popularity from a farmer's standpoint can be gauged than by the rapidly increasing membership of the associations. The following will denote the growth in ten years from their initiation:—

Year.	No. Associations.	No. Members.	No. Cows for Testing.
1895 ...	... 2 ...	47 ...	835
1905 ...	... 453 ...	9,709 ...	160,137

Eight years from the inception of the associations it was found the value of the butter exported had increased by £2,000,000 per annum, without any perceptible alteration in the total number of milch cows, pointing conclusively to a marked improvement in the average production of the herds. An increase in the quantity of by-products naturally followed, and their value would further enhance this sum.

When we see the dairymen of a country by close attention to the production of the individual cow have so raised the standards of their herds, that the increased yearly earnings amounted to more than the annual total value of the butter, cheese, and milk industry of this State, we should not hesitate in setting our minds towards improvement.

We fully recognise that the matter of scientific feeding is closely allied with that of high production, and, while not forgetting the importance of proper and systematic feeding, let us be assured that the fodder is being consumed by an animal that will give a good return.

The Horse.

THE OLDEST STUD OF DRAUGHT HORSES IN QUEENSLAND.

The Maryvale Shire horse stud which was lately dispersed, the Government having purchased the Maryvale Station for closer settlement, may fairly claim the above distinction. This stud was founded in 1855 by Messrs. Wienholt Bros., and Mr. Arnold Wienholt imported their first stallion from England. This was the Shire champion Iron Duke. A few years later, another stallion, England's Glory, was imported. Iron Duke, although a fine horse, which got splendid stock, was not appreciated by the station hands who had to do with him. When, as was the custom in those days, he was turned out with his mares in his paddock, he would "go" for any man who entered his domain, and would give chase to any stockman who had to enter the paddock. He was a "perfect terror" in this respect.

In reference to this stud, Mr. P. R. Gordon, late Chief Inspector of Stock, writes:—

"Arnold Wienholt—Wienholt Brothers—owned the Maryvale Estate, and it was he who imported the Shire horse Iron Duke. He was a good horse of his breed, although very bad tempered; and his descendants, sturdy steel-greys, were prominent in the Downs showyards for years. The Shires here, as in the other colonies and New Zealand, were not so popular as the Clydesdales, and after Mr. Wienholt had imported England's Glory, he decided on breeding on Clydesdale lines. He imported several pure stallions and mares, Highland Society prize-winners, and among others the magnificent Loch Fergus, a Scottish champion, and held to have been one of the finest horses of the breed that ever left Scotland, and for years was unapproachable in the Toowoomba and Brisbane showgrounds. The Maryvale stud was one of the best of the breed on the Australian continent, in evidence of which many stallions and mares from it were at different times bought for Victoria, the great Australian home of the breed.

"I forget the prices paid at the dispersion sale, but believe they ranged from £60 to £120. The Government bought several for State farms."

A FREAK BULLOCK.

Queensland has produced an extraordinary bullock—a freak which yielded two of the biggest kidney suets known. To all appearances the animal was quite normal when killed. The ordinary weight of a suet is 25 lb. to 30 lb., but this animal's weighed 180 lb. each, and were 38 in. in circumference. The dead carcass weighed 1,110 lb., so that there was nothing unusual in that respect. It was bred by Mr. McLaughlin, of Mexico Station, Jericho. On one instance in the experience of the butchers—Baynes Bros.—a bullock produced a balloon kidney weighing 84 lb.—"Farmer and Settler."

Poultry.

THE POULTRY INDUSTRY IN AMERICA.

Poultry-raising in the United States of America is looked upon as one of the most important of the adjuncts to general farming, and probably there is no other branch of agriculture which interests a greater number of people than poultry keeping. As James Dryden, professor of poultry husbandry in Oregon Agricultural College and Experiment Station says:—Soil or climatic conditions do not prescribe limits for the poultry industry. The poultryman is found in every State and in every county of the Union, and the farm without poultry is almost an anomaly. The farmer, however, does not monopolise the poultry business. The villager with his back lot, the suburban resident of the city, the needy invalid unable to work at hard labour, the woman in search of a livelihood, the man of wealth on his country estate, the practical farmer on his farm—all have an interest in fowls, either as a means of livelihood, a mental diversion, a pleasure, or a profit. To gain some idea of the vast importance of the industry in the United States, a study of the last United States census will be helpful. The census returns showed a value of poultry and eggs produced on the farms in that year of approximately 300,000,000 dollars (£60,000,000), without including the amount produced in towns and villages. Since then, prices of poultry products have advanced, and the industry has been growing. Taking these factors into consideration, the estimate of the value of poultry products for 1907 of over £60,000,000 is undoubtedly conservative. This is more than the value of the wheat crop of the United States for 1907, and exceeds the value of all the coal and petroleum produced in 1902. This estimate of £60,000,000 must be far below the present day value of the poultry products of the United States, for, in January, 1898, when writing on the subject, we showed that the earnings of poultry in that country amounted to £58,000,000, and during the succeeding eleven years the industry has been steadily expanding. In comparison with the returns from other industries in 1898—

	£
The earnings of poultry were	58,000,000
Value of the cotton crop	51,832,928
,, ,, wheat crop	47,587,799
,, ,, Oat crop	32,731,313
,, ,, potato crop	15,796,980
,, ,, tobacco crop	7,114,845
,, ,, swine	37,305,949

To put the matter in another way, the year's earnings of the poultry would have bought all the dairy cows in America, with £5,000,000 to spare; or they would have bought up all the gold, silver, wool, and sheep of that year, with the tobacco crop thrown in, and still there would have remained nearly six and a-half million sovereigns for some other speculation.

The above calculation was based on a selling price of eggs at 7½d. per dozen; of cocks, hens, and chickens at 1s. 3d. each; and of other fowls at 3s. 1d. each.

How does Queensland's poultry industry stand?

The last returns of the Statistical Department show that there were 688,285 fowls, and 58,583 ducks, turkeys, geese, &c., in the whole State. (In the United States they number about 400,000,000, and the egg-production about 14,000,000,000.)

The egg-production of Queensland last year was 2,455,023 dozens. At 7½d. per dozen for these, 1s. 3d. each for hens and chickens, and 3s. 1d. each on an average for other fowls, how much is our poultry industry worth? It stands thus:—

		£
Value of 688,285 fowls	... ...	52,016
„ 58,583 other poultry	... ...	8,998
„ 2,455,023 dozen eggs	... ...	76,719
		£137,733

Taking the population of Queensland at 500,00, this gives a fraction more than 5s. 6d. per head per annum of the entire population. If the poultry industry were in the hands of our 79,000 pupils in the State schools, it would be worth to each of them £1 15s. per annum.

Comparing this with the population of the United States—say, 80,000,000—the poultry industry is worth 15s. per head per annum to the population.

It will thus be seen that there is room for a very great expansion of the poultry industry in our State. There is an excellent market in the old country at certain seasons of the year for all the young poultry we can supply; whilst, with the means now available for preserving eggs, there is nothing to prevent a payable oversea trade in this product of the poultry yard.

At the same time, it is not by establishing large poultry farms that the largest increase in the business is to be achieved. There are, in the United States, some very large poultry farms which pay handsomely, but it must be remembered that consumers in that country number 160 to our 1, consequently, a very large home demand has to be satisfied before any eggs or fowls are available for export. It is by the aggregation of comparatively small poultry yards on the farms that the business in Queensland will increase.

But neither poultry keeping nor any other business can be carried on successfully (says "The Producer") by persons who are ignorant of the details of its management, or who do not carry out strictly and punctually the necessary work in connection therewith. Unfortunately, there are still some who think that poultry-keeping requires neither knowledge nor experience, and their failure is seized upon as proof that the industry will not pay. On the other hand, many are adding appreciably to their income by keeping poultry and a number have made poultry-keeping their sole business, with profitable results.

When times are bad many a farmer or householder will find their poultry a valuable "friend."

Think of the small amount expended in food, the waste from the table, assisted by peelings, stale vegetables, and meat scraps cooked daily, being the major portion supplied. Count up the eggs used weekly, as well as the poultry for dinner, and you will find that the despised hen or duck is assisting you through.

A setting of eggs from a satisfactory source will start a good flock of birds.

The very best layers in all breeds of poultry are proved to be the small tight-feathered members of the family.

Big coarse birds are invariably poor layers, and wherever size has been instilled egg production has fallen off. This is especially noticeable in the English breeds of Minorca and Leghorn, which were usually imported into Australasia, and the outlook would now be very bad if it had not been for the little egg machines procured from America.

Decide upon your programme for the year, secure your breeders, and hatch early.

Indian Runner drakes carry more flesh than is generally supposed, and if killed at about 9 to 12 weeks will be found excellent eating and with a small amount of waste.

The young ducks will start laying early, and if fed on soft foods with plenty of meat diet and shell grit provided, the output of eggs for 12 months will astonish the novice.

Put good-sized, well conditioned young poultry (almost self-fed after the first 6 weeks) on the market, and payable prices will result always.

America, the land of inventions (many of which so-called American inventions are merely the adaptation of those which owe their origin to British brains) has, during the past few months, made several important innovations in the poultry industry, amongst which, says a writer in the "Agricultural Gazette," London, the least interesting novelty is the mammoth incubator, several of which have lately been installed upon some of the larger plants. Six of these machines hold 7,000 eggs each, while one upon a large duck ranch has accommodation for no less than 28,000 duck eggs or 32,000 hens' eggs. These incubators are heated by hot-water pipes, a special boiler shed being provided, separated from the incubator room. The regulation of the temperature is done by means of various valves and thermostats, and by the raising or lowering of the egg trays within the machine. The chief advantages claimed for the mammoth incubator are economy of time in handling the large machines, less danger from fire, less expense for fuel, less trouble on account of dangerous gases formed by the combustion where many oil-heated lamps are used, and greater purity of the air due to not using up the oxygen in the incubator cellar, as compared with the heating of incubators with lamps.

It stands to reason that these huge incubators are only serviceable to those who conduct operations on an enormous scale. From advices received it appears that, so far, these machines have done their work extremely well.

WHERE ELECTRICITY HELPS.

Another novelty is the "Electrobator," an electrically heated and regulated incubator. One of these machines was recently exhibited at Chicago, and was of 6-dozen egg capacity, designed especially for the use of poultry keepers who reside in places where ordinary lighting current is obtainable, and who do not require large hatching capacity. It is claimed by the makers of the machine that, insomuch as no odour, gases, or dirt of any kind attaches to its use, the "Electrobator" can be used and will do satisfactory work in rooms where the owner of a lamp machine would not find it desirable to run an incubator heated by oil.

The "electroplane," which can be placed in the hatching chamber of any oil incubators now in use, is a flat metal plate, connected by means of a wire to any ordinary electric current.

Its purpose is to supply heat to the eggs, and the manufacturers claim for it that it will maintain a more even heat than is possible with either gas or oil. To take care of the chickens after they are hatched, an electric adaptable brooder called the "Electrohen" has been introduced, the temperature in which is maintained automatically at 90 degrees to 95 degrees for the first week, and after the chicks are older the regulator is adjusted to from 80 degrees to 85 degrees, until finally the artificial heat is dispensed with altogether.

In this device, as in all others here referred to, an electric thermostat cuts off the current whenever the temperature goes above the desired degree, and turns on the electricity automatically and infallibly when the temperature in the hatching or brooding chamber goes below the required heat. When the current is off, there is no cost whatever for running the machine.

FEEDING FOWLS.

Mr. James Dryden, Professor of Poultry Husbandry, at the Oregon Agricultural College, U.S.A., in the course of a lecture on the production and marketing of eggs and fowls, said, on the subject of feeding fowls:—

In the feeding of poultry on the farm, it is neither practicable nor desirable to compound elaborate rations. Where the fowls have the liberty of the fields, the question of feeding is very much simplified; they will there pick up a large percentage of their food. If the farmer were to confine his fowls in close yards, and feed them in the way he usually does on free range, the effect would be a poor egg yield and a loss of vigour in the fowls. The nearer we can follow Nature's teachings in the feeding of poultry, the better will be the results. No set rules can be laid down as to rations, but a knowledge of some of the general principles of foods and feeding will help the poultry man to avoid mistakes.

FOODS.

Successful feeding of poultry rests largely on a proper combination of foods rather than on any single food. There is no one food that will meet all the requirements of the fowls. It is not a question of wheat or corn or oats so much as it is a question of vegetable or animals foods, or, again, of protein or fats. The real value of corn or wheat has never been fully determined. The chemical composition of wheat is slightly better than that of corn for egg production; that is, it contains more protein than corn. On the other hand, digestion experiments now in progress indicate that a larger percentage of the corn is digested, or made use of by fowls than of wheat, but neither corn nor wheat should form the exclusive diet of fowls. The excess of fat-forming material is not a disadvantage in corn if it be fed in combination with other foods rich in flesh-forming or egg-producing material. If the fowls have access to animal food, such as meat scraps and the insects that may be found on the farm, they will themselves correct the undue proportion of fat-forming elements in the corn. In other words, they will balance their own rations. The feeding of poultry is not a question altogether of balanced rations, because a ration may be "balanced" without containing any animal food, and the ration must contain a large proportion of foods of animal origin for good results. Egg production, it is true, requires a narrow nutritive ratio, but the nutritive ratio does not indicate the presence of animal food or the reverse. The great scarcity of fresh eggs in winter is largely due to a scarcity of animal food. There is a close agreement between the food consumed and the product, whether it be eggs or meat. The proper feeding of poultry necessitates a careful study of the composition of foods, as well as of the product.

METHODS OF FEEDING.

The methods of feeding, as well as the rations, vary greatly. As already indicated, methods that would be successful with the fowls on free range would not be satisfactory for fowls confined in small yards. Where the fowls have the liberty of the fields, which usually furnish a plentiful supply of animal food, satisfactory results will be secured if the farmer will see that they have a liberal supply of grain. Corn or wheat should furnish the principal grain food. Whether corn or wheat be fed would depend on the prices of these grains. So far as is now known, the feeding value of these grains, under the conditions stated, would be about equal. The farmer can rest assured that he is making no very great mistake in feeding liberally either wheat or corn, if the market price is the same for each. To mix the two grains, however, will be an advantage. A variety of food will help the appetite. Oats are also excellent for laying fowls, and a little barley, by way of variety, may be fed. A good quality of wheat screenings may safely be substituted for higher-priced grain.

HOPPER FEEDING.

Under the conditions of the free-range system, the hopper method of feeding may be used to advantage. It will make a decided saving in labour, and ensure a plentiful supply of grain at all times for the fowls. The hoppers may be filled once a week, or, as often as is necessary, and placed where the fowls can help themselves at will. The feeding of wet mash to laying hens will not be profitable under the conditions of free range on the farm.

EXERCISE.

During the winter, a large proportion of nature's food on the farm is not available, so that different methods are necessary if eggs are to be secured. In the first place, the exercise which the fowls got in roaming over the fields will have to be provided in another way. [This, however, does not apply to Queensland, but only to countries like North America, where the ground is covered with snow in winter.—Ed. "Q.A.J."]

Exercise is just as necessary as the food. Access to a straw stack will keep the hens busy scratching for the stray kernel. A pile of clean straw on the floor of the poultry house, or in an open shed, will be an incentive for exercise if the grain is scattered in it. It is not necessary nor desirable to keep the hens shut up in close quarters.

ANIMAL FOOD.

There are various forms in which animal food may be fed. Bones and meat may be secured from the butcher, and a bone-cutter used to cut them up into small pieces. Horse meat may also be used, and on account of its comparative freedom from tuberculosis, is safer than meat from some butchers' shops. Skim milk is a good substitute for animal food, but it has the disadvantage of being so bulky that fowls cannot drink enough of it to supply the need for animal food. On this account, it is better to feed "clabbered" milk, or milk after it has become sour and thick, and the whey has been drawn off. Animal food is very largely fed in the form of dried beef scrap, manufactured in the packing houses. It may be fed dry or wet or mixed with a mash. About 8 to 10 per cent. as much dried beef scrap as total grain should be fed to laying fowls.

GREEN FOOD.

Green food may be fed in a variety of forms. Dry clover or lucerne—preferably the leaves—cabbage, lettuce, sugar beets, and mangels are all good. It is well, however, to feed clover or lucerne in addition to cabbage or beets, otherwise the yolks of the eggs will be too light in colour. Fowls must have a plentiful supply of green food at all times.

GRIT.

Fowls should be supplied with as much grit as grain, where none is available in the field. Gravel, crushed stone, lime, mortar, and sharp sand are all valuable as grit.

LIME.

For heavy egg-production, the ordinary foods do not contain enough lime for the making of shells. Broken oyster shells serve this purpose well, and, where they can be easily procured, should be kept before laying hens at all times. Lime, mortar, and broken limestone will also furnish egg-shell material.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order PALMÆ.

TRIBE ARECEÆ.

ORANIA, Zippel. (Named after the Prince of Orange.)

Spathes 2, lower short, tubular, compressed; upper large, clavate, cleft longitudinally. Spadix interfoliar, elongate, shortly peduneuled, branches slender, fastigiate: flowers minute, upper or all male, lower or all 3-nate, a female between 2 males. Male flower subsymmetric; calyx minute, 3-fid; petals oblong or lanceolate, valvate; stamens 3 or 6, filaments subulate, anthers erect, slits extrorse; pistillode conic. Female flower larger, ovoid; calyx membranous, 3-fid; petals ovate, obtuse, valvate; staminodes 3 or 6; ovary 3-gonous, 3-celled, stigmas recurved; ovules pendulous. Fruit globose, 1 to 3-celled, stigmas basilar. Seed globose, testa spongy, adherent to the endocarp: albumen equable; embryo-dorsal. Tall stout, unarmed palms. Leaves terminal, equally and regularly pinnatisect; leaflets linear, tips obliquely lobed or torn; strongly unicostate; petiole stout, sheath short.—Beccari and Hook, in Hook, Fl. Brit. Ind. The genus consists of about 6 species.

O. Beccarii, *Bail.: Areca appendiculata*, Bail. in Bot. Bull. IV. Dr. O. Beccari, the greatest living authority on palms, writes me that this is a distinct species of Orania; hence this change of genus. The specific name is changed because it might no longer be found applicable, in which case I hope botanists will allow me this privilege. The first description stands.

Dr. Beccari also says that my *Hydriastele costata*, Ql. Agri. Journ. II. = his *Gulubia costata*, in Ann. Jard. Buitenz, ii. (1885), a work to which I have no access; therefore I cannot furnish a generic description, but the specific description stands.

The same learned author also considers that my *Archontophœnix Jardinei*, Bail., should be changed to *Ptychosperma Jardinei*, Bail.

Order FUNGI.

LENTINUS, Fries, Epicrisis.

L. suffrutescens (Brot.), *Fries, Epicr.* Pileus of a tough-fleshy consistence, and convex funnel-shaped, unequal, smooth, glabrous rusty-coloured; stalks elongated, somewhat branching near the base and somewhat woody; gills crenate, or torn, of a pale or yellowish colour.

Hab.: Found growing under a coffee plant in the Brisbane Botanic Gardens, *J. F. Bailey*; also met with in Europe. Determined by M. C. Cooke.

POLYSTICTUS, Klotch.

P. leoninus, *Klotch.*, Linnæa viii. Pileus spongy-fleshy, soft, adnate-dimidiate, strigose-fibrous, fulvus without zones, margins deflexed; pores large, unequal, the teeth compressed, torn, and rusty purple.

Hab.: Stannary Hills, on wood, *Dr. T. L. Bancroft*; also found in India and New Guinea. Determined by M. C. Cooke.

The Orchard.

EXPORT OF GRAPES AND PEACHES TO LONDON.

Much interest has been aroused in the trial shipment of 20 boxes of grapes and 20 boxes of peaches, which went forward by the ss. "Sarpedon," on the 17th March. Mr. S. A. Bradley, of 64 King street, Melbourne, is the consignor, and Messrs. J. B. Thomas, Limited, London, are the consignees. The packages used are the well-known Patent Ventilated Safety Boxes. The grapes are being shipped in these without cork dust. The method is as follows:—The bunch is placed flat in the box, and a strip of flexible veneer wood is placed round same. Each end of the veneer wood is firmly, yet lightly, fixed to the side of the box, making a "pocket" of whatever size the bunch is. Thus the lower layer is formed; then a flat piece of light wood is placed on top, resting on the strips of veneer wood. On the top of this the same is repeated as in the lower portion of the box. Everything is ventilated freely. It may be mentioned that this is more than an experiment.

Grapes in these Patent Ventilated Packages carried to England last year in the same manner (without cork dust)—simply in the refrigerating chamber of the ship. Further, last year the grapes sent were picked late in the season, and were dead ripe, yet they arrived in splendid order. Should this be again successful this year—and there is no reason why it should not be—the grapes will be worth 2s. per lb. The varieties include Waltham Cross, Lady's Finger, Black Malaga, Wortley Hall, and Black Prince.

The peaches are packed in the same manner, but, instead of veneer wood, cardboard "pockets" are used. Two strips of cardboard, about 1½ in. deep, are slit at regular intervals horizontally. When placed transversely the slits dovetail, thus forming neat and regular compartments. One peach is placed in each compartment or "pocket," and, of course, cannot be damaged by bruising. In fact, each peach is in a "case" to itself. The variety shipped is similar to a very late Crawford, but is of Mr. Bradley's own raising.

The export of these to England opens up a new field of possibility, and Mr. Bradley is to be congratulated on his enterprise. Further progress will be reported later.

On 30th March, the same consignor sent 20 cases of various grapes by the ss. "Rostock" to Germany as a further test; the grapes being grown by Mr. C. Lenne, Ardmona. Again, by the ss. "Hector," on 13th April, 30 boxes went forward, being grown and packed by Mr. A. W. Potter, manager for Sir John Quick's orchard, Bendigo.

This packer has used these boxes for the New Zealand trade this season, and secured the very satisfactory price of 14s. per box of 22 lb. The objections, however, to the New Zealand trade are the high charges all round, and the 1d. per lb. duty. By sending to the English and German markets, the charges for freight, cool storage, and sundries are less than to New Zealand.

Although being sent ten times the distance, a report from a Dunedin agent (T. E. Shiel and Co.) states that the various consignments of grapes arrived there as if fresh cut from the vine.

Peaches also went forward to Townsville, in March, in these patent cases, and after 14 days, arrived in fine condition, and sold at splendid prices.

Mr. Bradley wishes to notify the growers who were disappointed because of being unable to obtain machines for peeling and coring apples the past season, that a consignment of the "Dandy' 'make is now to hand. A further consignment is expected next December, together with special evaporators for drying in moist climates.

PLANTING FRUIT TREES.

A most remarkable experiment in planting fruit trees has been made at the Woburn, and also at the Harpenden, Bedfordshire, Experimental Fruit Farms as well as at other places. From the last report of the former, it would appear that fruitgrowers have been for centuries wasting time and labour on careful, elaborate planting, which the report now declares to be quite unnecessary to success.

It is commonly thought necessary to prepare a large shallow hole, spreading out the roots in all directions, and arranging them near the surface with a slight upward turn at the ends, and then sifting in the soil with many precautions. This method of planting was tried, with that of crowding the roots into small holes, and ramming down the earth. The experiments were made not only at Woburn, but at Harpenden, Bedford, and other places, and 59 per cent. of the sets showed in favour of ramming, 27 per cent. showed no difference, and only 14 per cent. were against ramming.

There can, of course, be no question of the statements made in the above report, however they fly in the face of the generally accepted systems of tree-planting. It happens, however, that our own experience, to some extent, bears out what is claimed for the system of digging a post-hole and ramming the earth round the plant. This is precisely what we did three or four years ago with a young acacia tree brought from Barcaldine. The tree not being needed, we made a hole close to a fence-post, stuck the tree in, regardless of the position of the roots, and rammed the soil back against the post, thus jamming the tree in rammed earth. To-day, that young plant is a finely proportioned tree about 20 ft. in height, growing in full luxuriance.

It may well be that the results of the Woburn experiment will not find favour with orchardists either in the old country or here in Queensland. Nevertheless, it is certain that many will make experiments for themselves, as we have done. The "Agricultural News" of Barbados, in commenting on the above results, says, in reference to the following statement, viz., that—

"Examination of the trees shows that ramming has led to a copious development of fibrous roots. Direct experiments showed that the fibrous and small roots produced in the nursery before lifting play no great part as roots during the subsequent life of the tree; the important point is to induce fresh root formation, and the ramming does this more rapidly than the orthodox method of planting. No harm was done, and sometimes even good resulted, when the old roots were deliberately damaged before planting."

"Curators of botanic stations, especially, would be well advised to make experiments, if only on a small scale, similar to those described. In order to test the application of the Woburn results to the planting of oranges, limes, mangoes, cacao, &c., in these islands, it would be sufficient to set out a short row of each kind of tree, alternate trees in the rows being planted according to the old and the new methods, respectively. Where space is not limited, these trees need not be regarded as part of the permanent crop, but may be dug up later, in order to compare the effects of the two methods of planting upon the development of the roots."

DESTRUCTION OF ORCHARD PESTS.

Simple Remedies Proving Effective.

Mr. Froggatt (Government Entomologist) and Mr. Gurney (Assistant) are still after the scalps of the orchard insect pests, which they say go over the country in waves. This season, as everyone knows, both the fruit fly and the codlin moth are practically unknown over the principal fruit growing

areas in the State. Giving all due credit to the effect of the Fruit and Vegetation Diseases Act, there is no shadow of doubt that some climatic influence is responsible for this clearance. All the same the Government is wise in warning the growers that there must be no relaxing of vigilance, and we hear of many very simple remedies which are proving effective. Last year the fruit fly was greatly reduced by the plan of tacking on the tree a tin containing benzine or kerosene. The scent seemed to be the alluring characteristic, as one grower said "it did the trick." Now we hear of another grower who says he has achieved success in warring against the codlin moth by hanging round the trees thyme and pennyroyal! There are hundreds of farmers along our northern rivers who are willing to give over half a farm free of rent or royalty to orchardists willing to rid it of pennyroyal for codlin killing purposes. However, this orchardist's method is to make separate strips like small brooms of the pennyroyal and thyme, 1 in. wide, 6 in. long, and fastened with calico 1 in. wide round the trunk and placed alternately. These are then tied with string a little above the centre, the stalks being downward. Afterwards he placed a cape of waterproof over the herbs to shelter them from the sun and rain. The observant grower referred to said that he noticed that all insects avoided strong-smelling herbs. It takes less time to fix these pads than to spray the tree, and it is not so expensive. Many of his neighbours, he said, laughed at his "remedy," but now they are converts. The same orchardist also announces a remedy for aphides, which, he says, he has given four years' trial. His method is to use the thin zinc from the inside of packing cases, cut 15 in. to 18 in. deep, and put round the tree trunks, allowing it to lap a little. At the top and bottom of the strip is tied. Hessian bandages are then wound round the bottom of the zinc bandages to keep the aphis from getting underneath. Then get a tin of axle grease, add half the quantity of tallow, melt on the fire, mix half a pint of coal tar and let cool. Then paint the tin with the mixture. Do not let the tar get dry by painting now and again. The grease is to give the tar body. These methods should be worth trying.—"Australian Field."

DATES.

Wherever the date palm has been planted in Queensland under suitable conditions, male palms being present and planted to windward of the female trees, the result has been abundance of fruit. At Barcaldine the date palm finds an ideal home, also in the South, about Helidon, and now we find the finest dates we have yet seen in this State coming from Miva, four miles from Kilkivan Junction. There Mr. W. C. Wilson has three trees, two being males. The third tree has borne fruit for the past four years. Mr. D. O'Connor, of Oxley, saw the trees and obtained some fruit sprays carrying very fine dates, which he kindly brought to this Department. They were of excellent flavour, far before the dates seen in Brisbane shops. Unfortunately, we have not got particulars as to whence the trees were obtained, when planted, number of bunches, &c., which would have been very interesting to know. The illustration herewith will give an idea of the class of fruit produced.

Horticulture.

FLOWER GARDENING, No. 18.

PLANTS SUITABLE FOR IN AND OUT DOOR CULTURE.

By THE EDITOR.

POTTING PLANTS.

If new pots are to be used, be sure and soak them for several hours first, for, unless the pottery has been well moistened, it will suck out all moisture from the soil. Old pots are as good as and even better than new, but they should be well washed inside and out before using again. Warm soapsuds with a table-spoonful of washing soda dissolved in it, will wash the most soiled pot as clean as a new one. Fresh soil is the best for plants. A good standard potting compost may be made by using 2 parts of leaf mould, 1 part of well-rotted cow manure, and 1 part sharp sand. Leaf mould should be prepared by every gardener by gathering fallen leaves and piling them in a heap to decay. It is as well to throw a little soil over them to prevent them from blowing away. In eighteen months they are ready for use.

Good leaf mould is rather difficult to obtain, and should the soil be deficient in vegetable matter a little cocoanut fibre dust will be found of great advantage, as it keeps the soil open and porous, besides supplying humus. The cow manure should be well decayed and broken up fine. Good, clean, sharp, and gritty sand is a most important factor, and if the soil is inclined to be sticky, the proportion of this element should be slightly increased. The different ingredients should be well mixed together some time before using. A good sprinkling of bone dust may be added, mix well with the soil, then give a good watering and leave for a week; then stir the compost well once a day for a few days before using. It is very important that the soil should contain just the right proportion of moisture. It is about right when by taking up a handful and squeezing it the soil will just hold together. Have all the pots ready before starting work. If they are old ones see that they are well washed, if new ones soak in water before using, and allow the surface to dry. Drainage is the next item, broken crocks, small pieces of brick and charcoal may be used for this purpose. Place a large piece over the hole at the bottom of the pot, then place in the larger pieces, finishing off with a layer of small ones. Place a layer of moss, cocoanut fibre, powdered charcoal, or blacksmith's ashes over the top of the crocks, to prevent the soil washing down and choking the drainage.

As to the time of potting, it may be taken as a rule, to which there are few exceptions, that plants should never be potted unless their roots are in action. It is, therefore, a bad plan to pot indiscriminately in Spring, whether plants have commenced to grow or not; neither should they be shifted until the roots have penetrated the soil, and reached the sides of the pot. Newly potted plants should be kept close and have extra shade till they recover the check which shifting always causes. If plants dug up from the border are potted, injury is, almost of necessity, done to their roots, and the best plan is to put them in a dark part of the bush-house during the day and bring them out into the open air at night.

REPOTTING.

"It is a standing rule," says Sir J. Paxton, "with experienced culturists, that no specimen should be allowed a larger pot till the one in which it is growing is filled with fibrous roots; and that subsequent shifting be trifling

and oft repeated in preference to only one or two abrupt transitions annually. This is one of the prime secrets in the right management of flowers—the *sine quâ non* to distinguish, or even command success in cultivation." Furthermore he says: "If the soil be closely compressed into a hard mass, it must be shaken from the roots. For this, put the base of the ball on the ground, and strike gently all round with the hand. All plants that are thus freed from earth ought not to be planted in larger pots."

In shifting plants from one pot to another do not jump from a small pot to a large one. More damage is done to pot plants by this means than perhaps any other cause. People are so very anxious to obtain a fine large plant in a short space of time, and think if they give the plant plenty of room to grow in this end will be more quickly arrived at. The correct method of pot culture is just the opposite—the object aimed at should be to produce the finest specimen in a pot just sufficiently large to supply the requirements of the plant.

A great many mistakes are made when knocking the plant out of the old pot. To do this properly place the fingers over the soil with the stem of the plant between them, and hold the pot with the other hand. Reverse the pot and tap the rim on the edge of the potting bench, and the plant should turn out as from a mould, especially if a knife be first passed round between the pot and the soil in it. The ball of earth should be held bottom upwards and carefully examined. Remove the old pieces of drainage from among the roots. Look well over the roots, and if any are broken or diseased cut the damaged portions away with a sharp knife. If the roots should have the appearance of being diseased to a considerable extent, carefully wash all the old soil away from them so as to give them an entirely fresh start. If the roots appear to be healthy, do not remove the ball of earth from them, but carefully place in the centre of the new pot, first placing sufficient compost in it to bring the plant to about the right height in the pot when the soil is all filled in. If the plant is too deep take it out and add a little more compost, and if *vice versâ* remove a little of the compost. Do not place too deep, about an inch below the old mark is a good guide. You want as much of the new soil underneath the plant as possible. After placing the plant in position, fill the compost in round the edge of the pot, making it firmer close to the side of the pot than close to the roots of the plant. Do not be in a hurry to repot plants. Mistakes are often made in this respect. A good rule is, if the plant is healthy and growing, leave it alone. Different plants require different treatment. Palms like a more retentive soil and firm potting. Plants of a bulbous nature, such as Eucharis, Caladiums, &c., like a more friable soil, with plenty of sand, not too lightly packed. Begonias like a little blacksmith's ashes mixed through the soil. After repotting do not over-water until the plants have begun to make a good new root growth.

WATERING OF POTTED PLANTS.

A member of the Agri-horticultural Society of India, the Rev. T. A. C. Firminger, from whose excellent work, "A Manual of Gardening in Bengal and Upper India," I have made several quotations in this work, says that there is no operation in horticulture that requires judgment more than the giving to a plant just the amount of water beneficial to it, and no more. If too little be given, the plant will be starved and stunted; if too much, it will rot and die. As a general rule, the quantity of water a plant demands depends entirely upon the more or less vigorous state of growth it is in at the time. When observed to be making no growth, only just water enough should be given to keep it alive; when showing symptoms of starting into growth, then is the time to supply water with a liberal hand.

In watering delicate young plants, the can should be only filled with water to about a quarter of its capacity; for, if completely filled, the water will

issue from the rose, sometimes with so much force as to cause considerable damage to the plants. In watering most potted plants, however, it is best to discard the rose altogether, and administer water by laying the muzzle of the watering-pot upon the rim of the flower-pot, or only just above it. It cannot be too strongly impressed upon the amateur gardener that it is the roots of the plants that require water, and not the flowers, to which they so often so injuriously apply it—not even the leaves. The leaves of a plant do not imbibe water, and the only rational object there can be for casting water upon them is to cleanse them of dust and dirt, so as to keep open their pores for respiration. But the pores are situated principally upon the under surface of the leaves; therefore, the dashing of water upon them from above is a very ineffectual mode of operating, often, indeed, serving to splash much more dirt upon them from below than it removes from above. A very good plan is to provide several earthenware glazed pans of the same depth as the flower-pots. These are filled with water just so full that, when a flower-pot is placed in one of them, the water rises up to a level with the rim of the flower-pot. Each pot may be allowed to remain immersed for about six hours, by which time the water will force itself up through the hole in the bottom of the pot and thoroughly saturate the whole contents. A plant that has been thus treated will not require water again for three or four days. There need be no fear of the plants suffering from water lying stagnant at their roots, concerning which such strong cautions are usually given by those who insist upon the necessity of thorough drainage, as the water will dry up by evaporation long before it has time to stagnate. An advantage, moreover, resulting from this mode of occasionally watering potted plants of all kinds is, that the action of the water, forcing its way upwards, tends to loosen the soil and lighten it, counteracting the compression to which it has been subject from the daily beating down upon it of water from the watering-pot.

DRAINAGE OF POTTED PLANTS.

There is no point, the importance of which is so strongly insisted upon by all gardeners as the drainage of potted plants. The usual means, however, adopted for the purpose, prove, at least in hot climates, utterly ineffectual. The materials placed at the bottom of the pot, such as pieces of brick, charcoal, and potsherds, failing to act in the way of drainage altogether. For, in the first place, during the hot weather, from the constant daily watering which is indispensable, the upper portion of the soil in the pot becomes so dense and compact that no water, however liberally supplied, makes its way down to the drainage, or even to the soil for some height above it. A partial remedy for this is to lay flat, broken pieces of potsherd, or pebbles, or small clinkers, over the surface of the soil. The water then falls with all its force on these, and trickles between them into the soil below, without any great tendency to solidify it and render it impervious. And again, during the rainy season, if potted plants be put out, with the bottoms of the pots resting on the ground, or, indeed, upon any flat surface, no water will ever pass out of them from below. Upon this point one may easily satisfy oneself by merely placing out an empty flower-pot in heavy rain. It will soon become filled with water, which will remain in it very many days, till dried up by evaporation. Such being the case with an empty pot, much more is it likely to be so with one full of soil.

One remedy for this is, of course, very obvious, being merely to place two bricks side by side, about 3 or 4 in. apart, and upon them place the pot with the hole just half-way between. This also serves to exclude worms. Another remedy is to have pots made with drainage holes round the side, about 1 in. from the bottom. For begonias, achimenes, and choice and tender plants of that description, which require the shelter of a verandah, an excellent method is to procure a shallow pan for the plant to grow in, and to

drop it into a flower-pot about double its depth, so that the rim of the pan rests exactly upon the rim of the flower-pot. By this means drainage is rendered effectual, and insects are excluded.

WATERING PLANTS WITH HOT WATER.

So long ago as 1855 attention was drawn to the use of hot water for watering plants in a German publication entitled "Gartenflora."

Roses, palms, ficuses, fruit trees in pots, and other plants were experimented upon with great success. The plants, at one time vigorous, had sickened and developed certain signs of approaching death. The young leaves were limp, and the others were spotted with numerous black areas. The surface of the soil was scarified, and then copiously watered with water at the high temperature of 144 degrees Fahr. The water was applied until it ran out in abundance from the hole at the bottom of the pot. The water which first came through was perfectly clear, but later it was appreciably coloured brown. After this washing or irrigation the plants were placed into a warmer situation, and the following day the young leaves had pricked up, the ugly spots had ceased to grow, and three days later the two ficuses were restored to their pristine health. The plants soon threw out a large number of new roots and grew vigorously.

Recently a distinguished Belgian horticulturist has been interesting himself in experiments on clivias, palms, aspidistras, dracænas, primulas, begonias, and other plants, using water heated to about 125-130 degrees Fahr. His summarised comment is:—"We do not know how we can sufficiently recommend this practice, either as a curative or a preventive method." During the winter is perhaps the best time to adopt the hot-water treatment by amateurs, and those having plants in dwelling-rooms. It is a matter of common knowledge that soil enclosed in a pot in which a plant is growing ultimately become sour, and has, indeed, a certain poisonous quality. This toxicity is due to the presence of organic acid in excess, and which in the ordinary open-ground conditions would have been removed by bottom drainage. Plants growing in pots are under distinctly artificial conditions, and there are many causes which lead to the accumulation of these toxic acids. For instance, too deep planting, or when the roots are not sufficiently aërated, the use of over-hard baked pots or glazed receptacles, the compacting of the soil, and particularly the absence of or clogging of the drainage. Naturally this accumulation results in the burning of the young root tips. Activity is reduced, and the whole system of the plant suffers from the shock.

The editor of the "Garden and Field" suggests that, after the plant has been treated to the hot-water bath, it would be well to replace the loss of food elements by slight applications of liquid manure; nitrate of soda in mild doses may be used for all foliage plants in pots, but that, of course, is not a complete fertiliser, and must be supplemented by phosphoric acid and potash. Some plants are much less able to accept chemical food than others; generally speaking, palms and ferns require careful handling, but the ordinary rules of gardening practice will govern the operator. It is reasonable to believe that if the hot water will dissolve and wash out the poisonous acids it would also dissolve and carry off all essential elements of plant food. Therefore, they must be supplied artificially.

LIQUID MANURE FOR POT PLANTS.

Few people are aware of the great value of fertilisers applied in liquid form. Nearly every plant is benefited by its use at some period or other, and if applied prudently when the plants are most in need of some kind of stimulant the effect will be most observable, more especially in the case of plants in pots, where the space they occupy is circumscribed, and the properties of the soil soon become exhausted. How often we hear exclamations of surprise at the beautiful and healthy plants some growers produce, and the extremely

small pots they are in. The secret is the careful and regular application of liquid food when the plants are growing and their pots are full of roots.

Many of the ills which plants are heir to are believed by those who are ill-informed to be the result directly or indirectly of the use of manures, when the real cause generally is the poverty of the soils in which they are expected to thrive.

It will be apparent to every amateur that weak and unhealthy plants are more subject to insect pests than are the healthy and vigorous. All plants do not require manure at the same period, so the amateur must use a certain amount of discretion. As the hot weather advances liquid food will be required. Notice the appearance of the various plants, and apply it accordingly.

All liquid manure must be given in a weak state. The gardener must consider for what purpose he is using it, whether for foliage or flowers. If used to excess, the former will be at the expense of the latter. Plants like pelargoniums, zonales, cinerarias, petunias, calceolarias, and some other soft-wooded plants, for these once a week will be ample, until such time as they show their bloom buds, when twice a week, easing off as the flowers expand, and ceasing altogether when the plants are going to rest. Never apply to newly-potted or dormant plants, especially in winter time. Many greenhouse plants, palms, aspidistras, &c., that have become potbound, will be greatly aided by a judicious application of manure in a liquid form when they are starting to grow.

Perhaps the most simple, best, and most easily procured form is made by taking one kerosene tin full of fresh cow or horse manure (cow preferred); put in a bran bag and suspend in a barrel containing 30 gallons of water. Keep this stirred frequently for a week, and let it settle. When clear, 1 quart of liquid to 2 gallons of water will be sufficient to use.

Soot makes an excellent fertiliser. This may be prepared by putting a couple of gallons of soot (in a bag) to the same quantity of water as above, using a quart of the liquid to 3 gallons of water. This manure produces fine, dark foliage, and may be given to almost any plant requiring a stimulant without fear of injury. Ammonia, guano, superphosphates (besides fowl and pigeon manure), in fact, nearly all artificial manures, when the quantities and strength are known, may be dissolved in water, thereby bringing their fertilising properties into direct contact with the roots in the best possible manner.

Besides the above directions, some judgment is needed. Amateurs should use their intelligence, and they will soon learn how to vary treatment when it becomes necessary to do so.

Soapsuds have an undoubted value, because of their potash, irrespective of the animal matter they contain.

A writer in "The In-door Gardener" says that soapsuds are a great thing for pot plants. Few things are better for keeping away all kinds of blight. Pot plants are liable to be infested with several kinds of insects, the most common being aphis, mealy bug, scale, thrips, and red spider, to which may be added caterpillars. Aphides are most easily destroyed by tobacco than by any other substance; it may be used as smoke, infused in water, or as snuff. Ammoniacal liquor and soft soap in solution are also sure destroyers. Mealy bug is the most difficult of all to get rid of. Where climbers on a roof are infested, washing with a syringe or a garden engine, where it can be used without injuring the plants below, is tolerably effectual; but, generally, the only resource is to wash the bugs off with a stiff brush, using soft soap, Gishurst's Compound, or some other insecticide, among which an emulsion of kerosene and milk diluted with water are the most effectual. Scale must be brushed off in the same manner, or syringed with a powerful insecticide. Thrips may be destroyed by heavy syringing, sponging, or strong fumigation. For Red Spider, sulphur is an antidote, but the pest may generally be kept

down by strong syringing. When sulphur is applied, the plant must be held bottom upwards, and dry sulphur dusted on the under sides of the leaves, but it should not be permitted to fall upon the soil, as it is injurious to the roots. (Adamson's Australian Gardener.)

Ants are a great source of trouble in the plant-house, but they may usually be got rid of by carbolic acid or by an arsenical mixture made as follows:—

Mix flour, sugar, and arsenic to the consistency of putty with water, and place pieces of the mixture about the nests of the ants. If an examination is made a few days after using this remedy, hundreds of dead ants will be found in the vicinity of the poison, and it is very unlikely that the ants will reappear in a spot where the mixture has been used.

Caterpillars, slugs, and snails will also contribute their share of damage to plants in the border and in the plant-houses. These may be destroyed by trapping, and by poisoning. To trap slugs take a few cabbage leaves, dip them in a pot of boiling water, and smear a little fresh suet over them whilst warm. Lay these with the greasy side on the ground, and examine them often in the evening and early morning. They will be found covered with slugs in places where the latter are numerous. Another remedy is, to procure some corrosive sublimate in powder, one ounce to a gallon of water and half an ounce of muriatic acid, well mixed in a glazed, earthenware vessel and applied through the rose of a watering-pot. This will destroy all sorts of insect life, although these substances are injurious to some kinds of plants.

But nothing is so destructive to slugs as salt and tobacco powder, of which a thin sprinkling will not only destroy those these substance touch, but will prevent others crawling over the ground.

Cockroaches are often troublesome in plant-houses. They may be poisoned with arsenic mixed with honey or oatmeal, or phosphorous mixed with flour. The deadliest enemy of cockroaches is the common toad, and a few of these hideous but harmless reptiles will quickly clear them out of the plant-house. It has been stated that they are a nuisance amongst pot-plants, owing to their occasionally hiding themselves in the damp soil during the day. But this is a very small matter compared with the incalculable amount of good they do. To all agriculturists the toad renders conspicuous service, but gardeners and green-house owners may make this animal of especial value. Every gardener should aim to keep a colony of toads amongst his plants, and they may be easily kept from the pots by digging little shallow holes in the ground, and partially covering them with a bit of board or a flat stone. In such places, toads will often remain for days, sallying forth at night to seek their food, which consists of cockroaches, flies, moths, beetles, wire-worms, caterpillars, ants, worms, &c.

SISAL HEMP IN THE BAHAMAS.

Those who have read the history of the sisal hemp industry in the Bahamas in the pamphlet issued by the Queensland Department of Agriculture and Stock, on the sisal industry of Queensland, will remember that at one time the people of the Bahamas made strenuous efforts to extirpate the sisal plant, fortunately for themselves, without avail. The latest figures available in relation to sisal hemp cultivation in those islands show that the industry continues to expand. In 1908, the bales of sisal hemp exported from those islands numbered 12,884, as compared with 10,080 bales in 1907, and 3,467 bales in 1906. How long will it be before Queensland exports of sisal reach even 500 bales? Yet experience has shown that this State can produce far finer plants and larger and heavier leaves than any other sisal-growing country.

Tropical Industries.

SHED FOR CURING CIGAR TOBACCO LEAF.

By R. S. NEVILL.

The accompanying plan is intended to illustrate the method of constructing a modern cigar-leaf tobacco curing-shed, the object of which is to keep the temperature as uniform as possible, as sudden and extreme changes tend to make the leaf splotchy. It is designed to secure the desired results in the most economical manner, so as to be within the means of small growers, and can be extended or decreased in size as circumstances require. It is found, however, in practice that a width of 30 ft. is most desirable, but the length can be increased as desired. Any kind of bush timbers may be used in the construction, for posts preferably those which are known to be durable underground and which will best resist the ravages of white ants. The posts should be straight, with a regular and even taper, from 4 in. to 6 in. at the butt, let 4 ft. in the ground, and well rammed. Before fixing, the bottom of each post underground should have two coats of boiling tar. All ledges, braces, rafters, and racking should be straight and uniform in taper, not less than 3 in. at the small end, and should be scarfed and shouldered to posts and well spiked.

The walls and roof may be sheeted with pine or hardwood, or with sawn slabs, as circumstances may favour; in some cases 26-gauge galvanised corrugated iron may be preferred for roof covering. When this is used, it should be coated on both sides before fixing with two coats of refrigerating composition. The various malthoid preparations may also be used if cost is not considered. A cheap covering for roof and fairly durable is made of wheat straw soaked in alum water to render it fire-resisting, and laid on about 1 ft. in thickness, and secured with cords and pegs as ordinary thatch. In most districts, also, ample material exists for covering the walls with what is known as "wattle and daub." Easily bending twigs are nailed or interwoven pretty closely together to the ledges, and well-tempered clay or earth with a fair proportion of clay is then daubed over the whole, and brought to a fairly level face on front and back by this means. Often very durable work is obtained, especially if the roof eaves are given a good projection so as to prevent rain water running down the walls.

The side-shutters should be made of 6 in. by 1 in. pine, hung at the top with strong hinges so as to open outwardly from the bottom. It is thus hung to protect the opening from hard, sudden winds, that would whip and break the tobacco. The only fastener required is a strong wooden turnbuckle. Doors and shutters in each end of the shed should be made of 6 in. by 1 in. sawn pine, hung with strong T-hinges or bands and gudgeons.

The inside racking should be fixed 4 ft. apart horizontally and 3 ft. apart vertically, commencing at wallplate, going up and down; lower rack should be 5 ft. off the ground. The centre portion of lowest row of racking should be made to slip out easily to allow drays to pass through. The racks are so arranged that tails of tobacco on upper racks hang between butts of tobacco on lower racks.

Details of construction can be varied to suit the materials available, bearing in mind the object before stated.

A shed thatched, both sides and roof, is most desirable; and always cures a leaf more silky and elastic than any other, and, where it is possible, I strongly recommend it in preference to any other.

PROSPECTS OF COTTON-GROWING IN QUEENSLAND.

As the season is close upon us for cotton-planting, it is well that all information concerning the value of this industry should be placed before farmers in time to allow them to decide for or against devoting a portion of their land to cotton culture. The arguments in favour of so doing we have frequently adduced, and these are amply corroborated by the statements lately made by Mr. D. Jones, an experienced cotton-grower and expert, in an interview with Mr. Hy. A. Tardent, editor of the "Table Land Examiner," Atherton.

In conversation, Mr. Jones mentioned the fact that, in the sixties and seventies, this crop was the largest of any produced in the State. It reached its zenith in the year 1870 when the area under cotton was 14,574 acres. Thenceforward it dwindled down until the year 1886, when 15 acres only appeared on the list.

Asked for the cause of such a falling off, Mr. Jones said that it was primarily caused by low prices due to the revival of cotton growing in the American States, consequent on the cessation of the Civil War; by the high cost of transport from here to the United Kingdom, by the long delay in realisation of the proceeds on account of slow transit by sailing vessel; also to the inability to get any price for the seeds which are now a most valuable asset! A demoralisation in the culture, due to neglect in keeping up a high standard of selection in seed, consequently the yield per acre was not maintained: want of experience in combating insect pests, were also factors accounting for the decline of the industry.

Was not the cessation of the State bonus largely responsible for the abandonment of the crop? To this query, Mr. Jones replied: No: for a very large number of growers still grew cotton profitably long after the bonus had ceased. Subsequently a vigorous revival of the industry, occasioned by the erection of a spinning mill in Ipswich, served to indicate the value of the crop from the grower's and manufacturer's point of view. Unfortunately, owing to financial stress and hostile tariffs, and, stranger than all, an unsympathetic Administration, this worthy enterprise had to succumb after a five or six years' struggle.

What is then the present condition of the industry? To-day the outlook is decidedly better; thanks to the initiative of Messrs. J. Kitchen and Sons, who, for some three years, have pushed as far as practicable the industry ahead. In addition the most important development has been the reopening of the Ipswich Spinning Mill by Messrs. Joyce Bros., who have largely added to the mill plant, and who, despite this fact, are almost unable to cope with the orders on hand for their material, although working double shifts. This firm will absorb much more than this season's crop of Upland cotton, the variety they prefer for the particular class of material they make. At present, fibre is imported from India, America, and Java to satisfy this firm's need. The firm are doing all they can to encourage the local product as it is of a much superior quality than the imported ones.

What will be the prospect once the local demand is over-reached? There is a large and increasing demand for our article in the Southern States and New Zealand which have for years been largely importing from India and Java raw cotton for textile manufacture.

That being so, can you, whilst using white labour, compete with an article grown entirely by cheap coloured labour in foreign countries? It is, Mr. Jones averred, rather unfair that this industry, of nearly all others, should be singled out to do battle under these conditions, while sugar, coffee, rice, &c., are included in the Federal Bounties Act and have in addition substantial tariff protection.

But you have assistance from the Bounty Bill? Yes, there is a 10 per cent. bonus which shows the extent of the practical sympathy of the Federal Parliament. But even with this advantage I think it unfair that we should be handicapped with having to compete with a low-class fibre, grown by cheap coloured labour. It would only be fair if a duty of 1d. per lb. more were imposed on all imported lint and a corresponding protection given to cotton goods made in the Commonwealth. This would help the further production of cotton and ensure it becoming a permanent industry, employing a large army of both producing and manufacturing workers.

Then, in your opinion, there is here a great future for the cotton industry? Yes, given certain conditions, among which are those which best promote close settlement by small landholders who, with aid from their families, will make this crop either subsidiary or the chief object of their farming. Further, the State authorities might well give full effect to the new clause of last session's Land Act allowing 160 acres of land as a free gift to settlers complying with certain residence conditions. This in itself would materially advance the industry.

I gather from this statement that you consider this crop as suitable for settlers with little capital? That is so. I know of no crop from which a new settler can quicker, and with less cost, win a harvest from the soil.

In further explanation it was shown that the average return is from £6 to £8 per acre, to which must be added the bonus of 10 per cent. Frequently the yield per acre amounts to £10 and £12, and the cotton is harvested in six months from time of sowing.

Mr. Jones thoroughly approves of the action of the Agricultural Department in accepting in 1905 the responsibility of handling that season's cotton crop on behalf of the growers and much regrets their subsequent withdrawal from the position, inasmuch as the innovation, looked at from every point, was mutually satisfactory to both the Department and the planters. Under Mr. Jones' direction the cotton was received from the grower and ginned, an advance being made on delivery, the balance being paid to the grower on realisation of values for both lint and seed.

The experiment was carried out without cost to the State, as all expenses were deducted and growers realised ½d. per lb. over the original estimate of value. In that year, Mr. Jones stated, the owners obtained from £9 to as high as, in at least one instance, £17 per acre for the cotton crop.

What is your opinion of the Atherton district for this pursuit? Presuming that local prices are not too high for ordinary farm commodities, there is no reason why cotton should not be grown in that region. Some years ago a few acres of Upland cotton were grown around Atherton. I have no data of yield, but can say from examination that the article was a good one and much in demand.

Which varieties do you favour most? For the South, Russell's Big Boll, Tool's Improved, Griffin, and Jones' Hybrid are valuable Upland sorts to grow. Information sent Mr. Jones from the district of Capella indicates that, for that area, Jones' is superior to Russell's. Thus only experience and expert knowledge of localities and climatic conditions are to be depended on. Of the Sea Island or long staple varieties good returns have been got in the South; this staple is the most valuable of all, reaching from 8d. to 1s. 6d. per lb. when ginned. It should be largely tried in the North, being a more early bearer and of much greater value than either Mascotte or Caravonica growing in that region.

You place Sea Island as superior in value to all other sorts? Yes, although it is not so prolific a bearer in some localities; but its higher value will likely compensate for inferior yield.*

* This is not the experience of planters in the West Indies, who have been lately advised by the British Cotton-growing Association to substitute good Upland for Sea Island.—Ed. Q.A.J.

What is your opinion of the Caravonica variety? My observation is that among the Mascotte variety, there is an equally good staple, and, in numerous instances, shrubs giving a much more prolific crop. This variety, in my opinion, has not been in cultivation long enough to learn its full merits. It seems to me not to adapt itself to plantation conditions with the same vigour of growth as it does when volunteer in the scrub or forest, and is of less value than is sometimes figured at.

Summarising his opinions, Mr. Jones emphasised the fact that cotton could be grown nearly all over this State and the Northern Territory. He has by him samples of cotton from all over Australia, Solomon Islands, New Hebrides, Papua, &c., particularly good specimens having been obtained from the vicinity of Burketown and other places in the Gulf country, indicating that fibre of both long and short staples adapted for all spinning processes can be abundantly grown in Australia.

A last question, Mr. Jones: Do you need cheap labour for the cultivation of cotton as is often represented? An emphatic "no," was Mr. Jones' response. We have here, he said, cheap land, cheap transport, good and efficient mechanical appliances for tillage, suitable climatic conditions, all of which much overshadow in importance any supposed advantage connected with coloured labour. This was recently made obvious in the British Cotton Growing Association's report, which shows for the season's operations a loss of over £30,000, despite the supposed advantage attached to the employment of cheap Nigerian and Lagoan labour.

An active hustling adult can, at cotton-picking, earn from 5s. to 7s. and upwards per day. I have observed a young American at work earning his 1s. 3d. per hour. Of course, this man is an expert at the operation, which tends to prove that, if our farmers imitate American methods in handling this crop, we will have heard the last of either cheap or juvenile labour in connection with cotton production.

STEM GRUBS IN TOBACCO.

Mr. R. S. Nevill, Instructor in Tobacco Culture, writes:—Some experiments made in destroying the stem grub in the plant beds by Mr. Charles Toon, of Toon and Kiss, tobacco-growers on Eurie Creek, Bowen, will be of interest to tobacco-growers generally, and should further trials show it to be effective, it will certainly be a great saving to the growers throughout Australia. Mr Toon says he was able to keep his seed beds entirely free of the stem grub by spraying with the arsenate of lead—2 teaspoonfuls of the lead to 1 gallon of water. The first spraying was given when the plants showed three or four leaves; he sprayed again four days later, and after that every fortnight. He found no dead plants from the spraying, and there were no stem grubs in the beds so treated, while his beds not treated were badly infested as were those of his neighbours. On examination of the treated plants he says he found dead grubs just entering the stem of the plant, and also dead ones that had effected an entrance, but in no instance did he find any alive, and all had died before doing any injury to the plant. Mr. Toon is quite convinced the remedy is effective, and it is to be hoped other growers will find it so.

General Notes.

THE MONGOOSE FOR SNAKES.

The introduction of the mongoose some years ago to Barbados for the purpose of destroying rats and snakes in that island, no doubt resulted in the effect anticipated, but, wherever these little animals have been introduced, they have afterwards proved a serious pest to poultry, and in 1904, an Act was passed by the Barbados Legislature offering a reward of 3d. per head for the destruction of the mongoose, and providing a penalty not exceeding £5 to be imposed on any person who should import, or attempt to land a mongoose. At one time, it was proposed to introduce the mongoose into Queensland for the purpose of destroying rats in cane-fields. Fortunately wiser counsels prevailed. Whilst the cane-grub flourishes the fowl-yard is safe.

Now we learn that the St. Lucia (W.I.) Agricultural Society is taking steps to obtain a supply of mongoose (gooses or geese?) for that island, since snakes have been observed to be increasing in number in one or two districts. Sixty mongoose were recently imported into St. Lucia from Barbados, and it is proposed to get an additional supply of 100 from Barbados or Trinidad, and to distribute them in the island. It is to be hoped that when the snakes in St. Lucia are all killed, the mongoose will not prove such a pest as to necessitate a price being put on their heads.

Opinions on the usefulness or destructiveness of the mongoose appear to differ considerably in the West Indies. This is what the "Journal of the Jamaica Agricultural Society" says about the animal:—

"We have often written that there is no plague of mongoose and never has been. It is a useful animal and keeps rats in check; but it has been without reason blamed for almost every evil in the country. If hens' eggs are scarce, it is the mongoose to blame; if pigeons are scarce, through a bad breeding season or overshooting, it is the mongoose; because quails have been shot out for lack of preserving, it is the mongoose that is blamed. As a matter of fact we are just as scarce of flying birds which seldom venture on the ground as we are of ground birds; and wherever lands have been shut up and no shooting allowed, there are plenty of quails and pigeons. Great Britain swarms with game even though it is thickly peopled, and weasels and stoats abound—at any rate are just as plentiful as mongoose are here. The estates here that boast of trapping hundreds of mongoose a year will, within a short time, require to fight plagues of rats, use poisons by the hundredweight, traps by the score and spend several hundred pounds a year."

This appears to us the most rational view to take of the mongoose "pest." As the Editor says, Great Britain swarms with game. It also swarms with weasels, stoats, ferrets, foxes, and many flying predatory animals. Yet in spite of these there is no diminution in poultry and eggs or in grouse, partridge, pheasant, quail, &c., &c. The mongoose must be a terrible creature if it can work more harm than the British vermin.—Ed. "Q.A.J."

CLIMATE AND "STRONG" WHEATS.

The "strength" of wheat, which really means its gluten and flour content is a subject upon which we hear a good deal in this country, and we are told that it lies in the variety of wheat grown. This is evidently not the opinion of Professor F. T. Shutt, the well-known chemist to the Canadian experimental farms. This gentleman has devoted over a quarter of a century to investigations and experiments, with a view to the determination of the essentials for the production of the best wheats obtainable, and in a recent lecture at

Ottawa he stated that the opinion he had arrived at was that the chief factor in the production of the strong, glutinous, hard Manitoba wheat was the climate, and especially the fine hot weather, which dried off the soil during the later portion of the ripening. Grading the seed, varieties, and the fertile prairie soil might all play some small part in the production of these wheats, but all combined were nothing like equal to this one of climate. Referring to the experiments and researches now going on in England to improve the quality of wheat, Professor Shutt expressed the opinion that we must get a climate similar to that prevailing in the North-west of Canada before we can grow wheats of the same class and "strength" as were now produced in the prairie provinces of the Dominion.—"Agricultural Gazette."

TO DRAW A SPLINTER FROM A HORSE'S KNEE.

Clip off the hair round the edge of the wound, and apply a hot bran poultice twice or thrice daily. When changing the poultice apply some carbolic acid lotion to the wound (1 part carbolic to 30 parts water). To apply the poultice, a sugar-bag will be of service. Cut the bottom out of the bag, put the horse's foot through it, and tie the lower end of the bag below the knee; fill up with the bran poultice, and tie the upper part of the bag above the knee. If the splinter can be seen or felt, it should be carefully removed with a pair of forceps or tweezers, and the above treatment carried on for a few days. When Venice turpentine is used, it is applied to the wound like an ordinary ointment.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1908.								1909.				
	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.
North.													
Bowen	0·99	0·45	0·88	0·51	0·96	2·47	0·42	0·42	15·48	4·52	1·06	1·15	2·32
Cairns	3·05	0·59	3·70	2·12	0·74	3·07	1·60	1·41	32·05	5·25	21·03	14 19	1·06
Geraldton	18·52	2·64	8·11	3·66	2·81	6·93	3·80	1·69	47·92	10·29	37·31	28·51	5·98
Gindie State Farm ...	0·112	...	0·40	1·27	...	...	...	...	...	..	...	...	...
Herberton	0·38	0·31	2·36	Nil	0·51	1·27	0·61	0·78	12·41	2·28	3·52	0·70	0·81
Hughenden .	Nil	0·05	0·68	Nil	Nil	1·67	1·94	1·05	7·55	1·55	2·86	...	Nil
Kamerunga State Nurs.	3·363	0·76	4·85	1·58	...	3·64	1·69	...	...	3·52	...	4·95	0·97
Mackay	3·25	1·29	1·65	0·71	2·27	1·80	2·57	0·02	15·00	1·36	9·00	2·59	2·33
Rockhampton	0·85	0·10	1·08	0·84	0·20	2·14	2·47	1·37	9·01	2·01	1·68	1·21	0·3
Townsville	2·22	Nil	1·70	0·27	0·28	1·58	1·26	0·07	6·94	1·70	7·01	1·28	1·07
South.													
Biggenden State Farm	0·74	0·48	0·49	2·33	1·39	1·80	2·12	3·66	7·37	2·68	2·45	2·00	0·72
Brisbane	2·40	0·17	0·77	2·83	0·67	1·77	2·25	1·28	1·99	2·72	2·65	4·67	0·82
Bundaberg	0·67	0·39	0·75	1·56	1·10	2·39	0·73	3·34	6·52	3·70	5·06	1·54	0·67
Dalby	0·37	0·63	0·14	1·80	1·13	2·55	3·65	1·56	1·46	3·55	0·99	1·60	Nil
Esk	1·07	0·23	0·46	2·75	2·16	1·29	5·99	3·62	2·64	3·21	3·27	5·03	0·36
Gatton Agric. College	0·10	0·16	0·6	2·71	1·84	1·93	5·71	1·29	1·94	5·00	3·18	3·82	0·32
Gympie	2·00	0·38	1·16	2·87	1·37	2·49	2·58	3·97	3·86	3·77	3·41	2·34	1·15
Ipswich	1·14	0·12	0·47	3·23	1·19	1·48	5·09	1·05	1·37	1·95	2·66	4·56	0·5
Maryborough	1·05	0·46	0·81	1·98	1·05	1·84	1·92	1·64	8·36	7·11	2·28	2·14	0·91
Roma	Nil	0·55	0·63	1·38	1·12	2·15	2·79	1·68	5·19	4·85	4·18	1·91	0·44
Roma State Farm ...	...	...	1·27	0·73	...	...	...	...	...	...	...	...	...
Tewantin	8·66	0·75	1·97	2·70	2·18	2·30	7·50	4·12	6·44	3·31	4·34	9·37	1·00
Warwick	0·15	0·80	1·24	2·99	1·96	0·96	5·28	2·02	0·87	0·82	1·30	2·21	0·70
Westbrook State Farm	00·5	...	0·49	1·97	...	...	2·05	...	...	2·61	1·43	...	...
Yandina	4·59	0·58	2·64	2·18	1·50	3·10	6·03	2·75	6·69	6·42	3·71	5·25	1·10

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND,
Divisional Officer.

Answers to Correspondents.

DIPPING FLUID.

"AGRICOLA," Redlynch, Cairns—

In reply to your questions concerning a dipping fluid for ticks, Mr. G. Tucker, Veterinary Surgeon to the Department, says:—The mixture as recommended in the "Government Gazette" for 2nd August, 1902, if properly applied, should prove effectual. If a dip is not available, I would recommend the purchase of a good, powerful spray-pump, and the use of this implement for applying the dressing. To render it effectual in the destruction of ticks on the animals, every inch of skin and hair on the body must be well saturated with the solution. To prevent waste of dipping fluid, it is a good plan to spray the cattle in a crush provided with an impervious floor, and to drain the latter in such a way that the fluid, as it drips from the cattle, can be caught, and after filtering through a piece of canvas, be used again. I attach a leaflet showing the revised departmental formula for the preparation of dipping fluid. The second preparation mentioned contains too much arsenic, and is far too strong for general use. The soda is required for the purpose of dissolving the arsenic.

A GOOD LICK FOR STOCK.

"STOCK," Rockhampton—

A lick composed of equal parts of coarse salt and bonemeal, given in the proportion of 4 tablespoonfuls of the mixture per day, will be found to be the best bone-forming lick to give young stock. Where salt is not relished, the bonemeal may be mixed with molasses.

WHAT IS A PUNNET—A POTTLE?

MARKET GARDENER, Boonah—

A punnet is a shallow basket used in Covent Garden Market, London, for various vegetables. A sea-kale punnet is 8 in. in diameter at the top, 7½ in. at the bottom, and 2 in. deep. Radish punnets are 8 in. in diameter and 1 in. deep. Mushroom punnets are 7 in. in diameter and 1 in. deep. Grapes are put up in 2 lb. and 4 lb. punnets. New potatoes in 2 lb. punnets. Strawberries in the Southern Fruit Markets (Victoria and New South Wales) are put up in punnets holding 1 quart.

A pottle is a large tapering basket holding rather more than 1½ pints. A pottle of strawberries is supposed to contain ½ gallon, but seldom holds more than 1½ pint. A pottle of mushrooms should weigh 1 lb.

PRICKLY PEAR AS FOOD FOR STOCK.

W.B., Dalby—

In reply to your questions *re* Prickly Pear, you will find them completely answered in Vol. XI., "Q.A.J.," December, 1902, p. 450; Vol. XVI., May, 1906, p. 574 (Analysis); and Vol. XXI., July, 1906, p. 6; and Aug., 1908, p. 62.

Please note that correspondents should give their names as well as a *nom-de-plume* or merely initials, the former not necessarily for publication.

CIGAR-MAKING.

"CHEROOT," Herbert—

There is no book or pamphlet which we are aware of published on the subject of cigar-making. Mr. Nevill, Instructor in Tobacco-culture, says that cigar-making is a trade which requires an apprenticeship. Cigar-making on the tobacco farm is not permitted by law. If you made 100 cigars you would have to pay duty on them. The leaf also has to be cured in a particular manner for cigar-making.

See June issue of the "Journal" for further information as to the saltpetre method of tree and stump destruction.

GUANGO-TREE—WHITE ANTS.

BRISTOLIAN, Darling Downs.—

Article on guango-tree received. Bore holes in the anthills, insert some bi-sulphide of carbon. The fumes will destroy every ant, and there will be none to form new nests. You may fire the bi-sulphide if due precaution is taken to cover the hill after charging, using a light at the end of a long stick. There is no other remedy except poisoning.

Times of Sunrise and Sunset at Brisbane, 1909.

DATE.	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6 13	5·16	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·31	5·0	6 39	5 4	6·30	5·19
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·32	5·0	6·39	5·4	6·29	5 20
5	6·15	5·13	6·32	5·0	6·39	5·5	6·28	5·20
6	6·16	5 13	6·33	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·6	6·26	5·21
8	6·17	5·11	6·33	4·59	6·39	5·6	6·26	5·22
9	6·18	5·10	6·34	4·59	6·39	5·7	6 25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·35	4·59	6·39	5·7	6·23	5·23
12	6·19	5·8	6·35	4·59	6·38	5·8	6·22	5 24
13	6·20	5·8	6·35	4·59	6 38	5·8	6·22	5·24
14	6·20	5·7	6·36	4·59	6 38	5·9	6·21	5·25
15	6 21	5 7	6·36	5·0	6·38	5 9	6·20	5·25
16	6·22	5·6	6·37	5·0	6·37	5·10	6·19	5 26
17	6 22	5·6	6·37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·5	6·37	5·0	6·37	5·11	6·17	5·27
19	6·23	5·5	6·37	5·0	6·37	5·11	6·16	5·27
20	6 24	5·4	6·37	5·0	6·36	5·12	6·15	5·28
21	6·25	5·4	6 38	5·0	6·36	5 12	6·14	5·28
22	6·25	5·3	6·38	5·0	6 36	5·13	6·13	5·29
23	6·26	5·3	6·38	5·1	6·35	5·13	6·12	5·30
24	6·26	5·3	6·38	5·1	6 35	5·14	6·11	5 31
25	6·27	5·2	6·39	5·1	6·34	5·14	6·10	5·31
26	6 27	5·2	6·39	5 1	6·34	5·15	6·9	5·31
27	6·28	5·2	6·39	5·2	6·33	5·15	6·8	5·32
28	6·28	5·1	6·39	5·2	6·33	5·16	6·7	5·32
29	6·29	5·1	6·39	5 2	6·32	5·16	6·6	5·32
30	6·29	5·1	6·39	5·3	6·32	5·17	6·5	5·33
31	6·30	5·0	...	...	6·31	5·17	6·4	5·33

PHASES OF THE MOON.

		H. M.
5 May	○ Full Moon	10 8 p.m.
13 ,,	☽ Last Quarter	7 45 a.m.
19 ,,	● New Moon	11 42 p.m.
27 ,,	☾ First Quarter	11 28 a.m.
4 June	○ Full Moon	11 25 a.m.
11 ,,	☽ Last Quarter	0 43 p.m.
18 ,,	● New Moon	9 28 a.m.
26 ,,	☾ First Quarter	4 43 ,,
3 July	○ Full Moon	10 17 p.m.
10 ,,	☽ Last Quarter	4 58 ,,
17 ,,	● New Moon	8 45 ,,
25 ,,	☾ First Quarter	9 45 ,,
2 Aug.	○ Full Moon	7 14 a.m.
8 ,,	☽ Last Quarter	10 10 p.m.
16 ,,	● New Moon	9 55 a.m.
24 ,,	☾ First Quarter	1 55 p.m.
31 ,,	○ Full Moon	3 8 ,,

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	JUNE. Prices.
Apples (Hobart), per case	7s. to 8s.
Apples (Victorian), per case	5s. to 7s.
Apples (Local), per case	3s. 6d. to 4s. 6d.
Apples (Cooking), per case	4s. to 7s.
Bananas (Cavendish), per dozen	1¼d. to 2¼d.
Bananas (Sugar), per dozen	1¼d. to 2½d.
Cape Gooseberries, per box	8s. to 9s 6d.
Custard Apples, per quarter-case	3s. to 3s. 6d.
Lemons (Italian), per case	9s.
Lemons (Sydney), per case	2s. to 5s.
Mandarins, per case	3s. 6d. to 6s.
Oranges (Northern), per case	2s. 6d. to 3s. 6d
Oranges (Local), per case	2s. 6d. to 3s. 6d.
Papaw Apples, per quarter-case	1s. 6d.
Passion Fruit, per quarter-case	2s. 9d. to 3s. 6d.
Pears, per case	8s. 6d. to 9s.
Pears (Hobart), per quarter-case	...
Pears (Victorian), per quarter-case	...
Persimmons	1s. 6d. to 3s. 9d.
Pineapples, Rough, per dozen	1s. 6d. to 3s.
Pineapples, Smooth, per dozen	5s. 6d. to 6s.
Pineapples, Ripley Queen, per dozen	4s. to 5s.
Rosellas, per sugar bag	2s. to 3s.
Strawberries, per tray	3s. to 3s. 3d.
Tomatoes, per quarter-case	1s. to 3s.

SOUTHERN FRUIT MARKET.

Article.	Prices.
Apples (Hobart), per case	5s. to 7s.
Apples (Victorian), per case	5s. to 6s.
Apples (Local), per case	6s. to 7s.
Apples (Cooking), per case	2s. 6d. to 3s. 6d.
Bananas (Queensland), per bunch	1s. 6d. to 4s. 6d.
Bananas (Queensland), per case	8s. to 8s. 6d.
Lemons (Local), per gin case	10s.
Lemons (Italian), per half-case	12s. to 13s. 6d.
Mandarins (Local), per half-case	6s
Mandarins (Emperors), per gin case	12s. to 14s.
Mandarins (Medium), per half-case	3s. 6d to 5s.
Oranges (Choice), per case	5s. to 6s.
Oranges (Navel), per case	7s. 6d.
Passion Fruit (Choice), per half-case	3s. to 3s. 6d.
Peanuts, per lb.	5d.
Pears (Choice), per gin case	10s. to 12s.
Pears (Medium), per gin case	6s. to 7s.
Persimmons, per box	3s.
Pineapples (Queensland), Ripley Queen, per case	8s. to 9s.
Pineapples (Queensland), Choice, Queens, per case	7s. to 8s.
Pineapples (Queensland), Choice Common, per case	8s. to 9s.
Quinces, per gin case	2s. to 3s.
Rock Melons, per dozen	...
Strawberries (Local), per dozen punnets	...
Tomatoes (Local), per half-case	2s. 6d. to 3s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JUNE.

Article.		JUNE. Prices.
Bacon, Pineapple	lb.	$7\frac{1}{2}$d. to 9d.
Barley, Malting	"	3s. 6d. to 3s. 9d.
Bran	ton	...
Butter, Factory	lb.	9d. to 10d.
Chaff, Mixed	ton	£5 10s.
Chaff, Oaten	"	£4 15s.
Chaff, Lucerne	"	£5 to £7 10s.
Chaff, Wheaten (Straw)	"	£2 15s. to £3 5s.
Cheese	lb.	8d. to 1s.
Flour	ton	£12 10s.
Hay, Oaten	"	£5 10s. to £6.
Hay, Lucerne	"	£5 to £5 5s.
Honey	lb.	$2\frac{1}{2}$d.
Maize	bush.	4s.
Oats	"	3s. 3d. to 3s. 4d.
Pollard	ton	...
Potatoes	"	£5 10s. to £6 10s.
Potatoes, Sweet	"	£2 to £2 10s.
Pumpkins	"	£1 15s. to £2.
Wheat, Milling	bush.	5s. 6d.
Wheat, Chick	"	...
Onions	ton	£7 10s. to £8 10s.
Hams	lb.	1s. to 1s. $0\frac{1}{2}$d.
Eggs	doz.	1s. $0\frac{1}{4}$d. to 1s. 7d.
Fowls	pair	2s. 6d. to 3s. 6d.
Geese	"	6s. to 6s. 6d.
Ducks, English	"	3s. 3d. to 3s. 8d.
Ducks, Muscovy	"	3s. 9d. to 4s. 9d.
Turkeys (Hens)	"	6s. to 7s.
Turkeys (Gobblers)	"	10s. to 14s.

ENOGGERA SALEYARDS.

Animal.	MAY. Prices.
Bullocks	£8 5s. to £9 12s. 6d.
" (single)	£13 12s. 6d..
Cows	£5 17s. 6d. to £7 5s.
" (single)	£9 5s.
Merino Wethers	18s.
Crossbred Wethers	19s. 9d.
Merino Ewes	15s. 3d.
Crossbred Ewes	16s.
Lambs	13s. 9d.

Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, sisal hemp, cotton, and sugar-cane may now be planted. Sow maize for an early crop. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to a fine art.

In choosing maize for seed, select the large, well-filled, flat grains. It has been shown that, by constantly selecting seed from prolific plants, as many as five and six cobs of maize can be produced on each stalk all over a field A change of seed from another district is also beneficial. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may be sown, but they will have to contend with weeds which will begin to vigorously assert themselves as the weather gets warmer; therefore keep the hoe and cultivator constantly going in fine weather. Tobacco may be sown during this month. If vines are available, sweet potatoes may be planted towards the end of the month. In this case also it is advisable to avoid too frequent planting of cuttings from the old vines, and to obtain cuttings from other districts. If grasses have not yet been sown, there is still time to do so, if the work be taken in hand at once. Sugar-cane crushing will now be in full swing, and all frosted cane in the Southern district should be put through the rollers first. Plough out old canes, and get the land in order for replanting. Worn out sugar lands in the Central and Northern districts if not intended to be manured and replanted, will bear excellent crops of sisal hemp. Rice and coffee should already have been harvested in the North. The picking of Liberian coffee, however, only begins this month. Collect divi-divi pods. Orange-trees will be in blossom, and coffee-trees in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnip, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2·63 in., and for September 2·07 in., increasing gradually to a rainfall of 7·69 in. in February.

Orchard Notes for August.

By ALBERT H. BENSON, M.R.A.C.

THE SOUTHERN COAST DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of Citrus Fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where Winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with the lime and sulphur wash.

Where there are inferior sorts of seedling citrus trees growing, it is advisable to head same hard back, leaving only the main trunk and four or five well balanced main branches cut off at about 2 ft. from the trunk. When cut back give a good dressing with the lime and sulphur wash. Trees so treated may either be grafted with good varieties towards the end of the month or early in September; or, if wished, they may be allowed to throw out a number of shoots, which should be thinned out to form a well balanced head, and when large enough should be budded with the desired variety.

Grafting of young stock in nursery, not only citrus but most kinds of deciduous fruits, can be done this month. It comes in useful in the case of stocks that have missed in budding, but for good clean grown stocks I prefer budding.

In the case of working our Seville orange stocks to sweet oranges, grafting is, however, preferable to budding, as the latter method of propagation is frequently a failure. The Seville stock should be cut off at or a little below the surface of the ground. If of small size, a single tongue graft will be sufficient, but if of large size, then the best method is the side graft—two or more grafts being placed in each stock, so as to be certain of one taking. In either case the grafts are tied firmly in place, and the soil should be brought round the graft as high as the top bud. If this is done, there will be few missed, and undesirable Seville stocks can be converted into sweet oranges.

In selecting wood for grafting, take that of the last season's growth that has good full buds and that is well-matured—avoid extra strong, or any poor growths.

Seville oranges make good stocks for lemons. In case it is desirable to work them on to lemons, it is not necessary to graft below ground, as in the case of the sweet orange, but the stock can be treated in the same manner as that recommended in the case of inferior oranges—viz., to head hard back, and bud on the young shoots.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the trees' use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or lesser extent.

Where necessary, quickly-acting manures can be applied now. In the case of orchards, they should be distributed broadcast over the land, and be

harrowed or cultivated in: but, in the case of pines, they should be placed on each side of the row, and be worked well into the soil.

The marketing of pines, especially smooths, will occupy growers' attention, and where it is proposed to extend the plantations the ground should be got ready, so as to have it in the best possible condition for planting, as I am satisfied that the thorough preparation of the land prior to planting pines is money very well spent.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You only want one strong shoot from your cutting, and from this one shoot you can make any shaped vine you want. Just as the buds of the vines begin to swell, but before they burst, all varieties that are subject to black spot should be dressed with the sulphuric acid solution—viz., three-quarters of a pint of commercial sulphuric acid to one gallon of water: or, if preferred, this mixture can be used instead—viz., dissolve 5 lb. of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid.

TROPICAL COAST DISTRICTS.

Bananas should be increasing in quality and quantity during the month, and though, as a rule, the fruit fly is not very bad at this time of the year, still it is advisable to take every care to keep it in check. No over-ripe fruit should be allowed to lie about in the gardens, and every care should be taken to keep the pest in check when there are only a few to deal with, as, if this is done, it will reduce the numbers of the pest materially later on in the season. The Spring crop of oranges and mandarins will be now ready for marketing in the Cardwell, Tully, Cairns, and Port Douglas districts. For shipping South see that the fruit is thoroughly sweated, as unless the moisture is got rid of out of the skins the fruit will not carry. Should the skins be very full of moisture, then it will be advisable to lay the fruit on boards or slabs in the sun to dry; or, if this is not possible, then the skin of the fruit should be artificially dried by placing same in a hot chamber, as the moisture that is in the skin of our Northern-grown citrus fruits must be got rid of before they will carry properly.

Papaws and granadillas should be shipped South, and the markets tested. If carefully packed in cases holding only one layer of fruit, and sent by cold storage, these fruits should reach their destination in good order. Cucumber and tomato shipments will be in full swing from Bowen. Take care to send nothing but the best fruit, and don't pack the tomatoes in too big cases, as tomatoes always sell on their appearance and quality.

SOUTHERN AND CENTRAL TABLELANDS.

All fruit-tree pruning should be finished during the month, and all trees should receive their winter spraying of the lime and sulphur wash.

All new planting should be completed, orchards should be ploughed and worked down fine, and everything got ready for Spring.

In the warmer parts, grape-pruning should be completed, and the vines should receive the Winter dressing for black spot. In the Stanthorpe district grape-pruning should be delayed as late as possible; so as to keep the vines back, as it is not early but late grapes that are wanted, and the later you can keep your vines back the better chance they have of escaping Spring frosts.

Towards the end of the month inferior varieties of apples, pears, plums, &c., should be worked out with more desirable kinds; side, tongue, or cleft grafting being used. In the case of peaches, almonds, or nectarines, I prefer to head back and work out by budding on the young growth.

Agriculture.

FERTILISERS FOR VARIOUS CROPS.

The main characteristic of the soils of Australasia (says J. Montgomerie Hattrick, F.H.A.S., N.D.A.) is, broadly speaking, the deficiency of phosphoric acid, and, naturally enough, where one ingredient is very deficient, the effects of supplying this ingredient in a suitable form are so very marked as, in a great measure, to overshadow the benefits to be obtained by adding another manurial ingredient, which may also be lacking, though in a lesser degree. So marked, indeed, are the effects of superphosphate and other phosphatic manures in Australasia, that he has noted, in some districts a tendency among practical men to use the word "fertiliser" as synonymous with "phosphate." It is, therefore, not a matter for wonder that, while farmers know, from practical experience, the comparative values, properties, and effects of various phosphatic manures very well indeed, considerable ignorance prevails in regard to potassic manures which are, in their way, quite as important and essential as the popular phosphates. In wheat-growing for grain in Australasia, the use of potash manures is restricted to certain districts, where the soils are exceptionally deficient in potash. But in the growth of nearly every other crop potash, added to phosphoric acid in the correct proportion, will be found very beneficial, and, as will be shown later by actual experiment results, the returns obtained from money spent in buying potash are, in many cases, relatively greater than the returns from money expended in the purchase of other manurial ingredients.

That the importance of potash, however, is being gradually recognised by the agriculturists of Australasia is shown by the fact that, whilst in 1899 the total quantity sold in the States was only 202 tons of pure potash, in 1908 this had increased to 1,333 tons.

Now, what are the properties of potash as a manure? Potash is one of the eight mineral constituents which are essential to plant life. Of these eight, only three, as a rule, are removed to such an extent, in the course of cropping, as to necessitate returning them in some form or another to the soil in order to maintain its productivity. These three manurial ingredients are potash, phosphoric acid, and nitrogen.

There is no need to tell the generality of farmers who use artificial manures what effect these have in the formation of plants and their fruits, as that is well known to them by experience. There are various forms of artificials which contain the above ingredients. Potash, for instance, occurs in the forms of muriate and sulphate of potash, which differ somewhat from each other in that, for one thing, muriate of potash of 95 per cent. contains, in every 100 lb., 8 lb. more pure potash than does a similar quantity of sulphate of potash of 95 per cent. The muriate, again, is generally about 10s. per ton cheaper than the sulphate; its effects, so far as crops are concerned, are nearly the same as those produced by the sulphate, but on soils deficient in lime, and with all fruit and root crops, sulphate will give better results. Next comes what is known as 30 per cent. potash manure, which, as its name indicates, contains 30 per cent. of pure potash, present almost entirely in the form of muriate, whilst its other constituents are mainly common salt and magnesium compound. It is not very suitable for the dry parts of Queensland, but in the very moist districts of the far North of the State it is valuable as a top-dressing for pasture.

It should only be mixed with other manures shortly before use.

Kainit is another potash manure, containing a minimum of 12·4 per cent. of pure potash in the form of sulphate. Kainit should not be used on

wheat, potatoes, or fruit crops, the other forms being preferable. It is, however, specially suitable for mangolds and asparagus, and is of great value in killing various insect pests.

Which is the cheapest form of potash? Using the principle of unit values, this is easily calculated. A unit means 1 per cent. of valuable ingredient in 1 ton of fertiliser. To ascertain, then, the relative costs of potash in each of the potassic manures above enumerated, all we have to do is to divide the price per ton by the minimum guaranteed percentage of potash in the manure. Thus, if—

(*a*) Sulphate of potash, containing 52 per cent. potash, is sold at £14 per ton;

(*b*) Muriate of potash, containing 60 per cent. potash, is sold at £13 10s. per ton;

(*c*) Potash manure, containing 30 per cent. potash, is sold at £7 10s. per ton;

(*d*) Kainit, containing 12·4 per cent. potash, is sold at £4 5s. per ton; we find—

(*a*) £14	=	280s.	÷	52	=	5s. 4½d.	per unit.
(*b*) £13 10s.	=	270s.	÷	60	=	4s. 6d.	,,
(*c*) £7 10s.	=	150s.	÷	30	=	5s.	,,
(*d*) £4 5s.	=	85s.	÷	12·4	=	6s. 10d.	,,

These calculations show that the cheapest source, at the prices above quoted, is muriate of potash; 30 per cent. potash manure comes next; sulphate of potash third; while kainit is the most expensive form in which potash can be bought.

Muriate should be used where there is abundant lime in the soil; sulphate for all fruit crops, for potatoes, vines, sugar-cane, tobacco, and most tropical products.

As a rule, potash should never be used alone. It may be applied alone at one time of the year, provided other fertilisers, such as phosphoric acid, are also applied at another time in the same season. In any case, it is essential that it should form part of a well-balanced combination of manures. For example, in Europe, wheat usually gives the most profitable results when a complete fertiliser is used—that is, a fertiliser containing potash, phosphoric acid, and nitrogen; whereas in Australasia a wheat crop gives the best results when superphosate alone is used.

FERTILISERS FOR VARIOUS CROPS.

Mr. Montgomerie makes the following suggestions of the composition and amounts of fertilisers for use upon various crops in this country, which are based on actual experience over a series of years in Australia:—

CEREALS.

1. Wheat, Barley, and Oats:

(*a*) For Grain—

¾ cwt. superphosphate, per acre.
30 lb. sulphate of potash, per acre.

(*b*) For Hay—

½ cwt. bonedust, per acre.
½ cwt. superphosphate, per acre.
¼ cwt. muriate of potash, per acre.

2. Maize:

For Grain—

3 cwt. superphosphate
1 cwt. sulphate of potash } per acre.

Maize, Sorghum, and Millet:

For Ensilage or Green Fodder—

3 cwt. superphosphate
1½ cwt. sulphate of potash
½ cwt. sulphate of ammonia } per acre.

In manuring maize, it is usually an advantage to apply about two-thirds of the manure when the seed is sown, and the remainder about the time of tasselling.

FORAGE CROPS.

Lucerne, Clover, and other Legumes—

$1\frac{1}{2}$ cwt. superphosphate.
$\frac{3}{4}$ cwt. sulphate of potash.

This dressing is also suitable for peas, beans, &c.
For these crops the soil should be fairly rich in lime.

FRUIT TREES.

1. Apples, Pears, Quinces, Loquats, Figs, Olives—

2 cwt. bonedust
1 cwt. superphosphate — per acre
1 sulphate of potash

associated with green manuring. An application of lime, broadcast, should be made every three years in the case of all fruit crops.

2. Citrus Fruits: Oranges, Lemons, Limes—

2 to 5 lb. bonedust
1 to $2\frac{1}{2}$ lb. superphosphate — per tree.
1 to $2\frac{1}{2}$ lb. sulphate of potash

The lighter dressing is for trees up to eight or nine years old. Above this age, the dressing should be increased gradually until it reaches the heavier dressing recommended above.

3. Cherries and Plums—

$\frac{3}{4}$ cwt. sulphate of ammonia
2 cwt. superphosphate — per acre.
1 cwt. sulphate of potash

4. Grapes (Vineyards)—

2 cwt. superphosphate
1 cwt. nitrate of sode — per acre.
1 cwt. sulphate of potash

5. Peaches, Nectarines, Apricots, Almonds—

2 cwt. superphosphate
$\frac{3}{4}$ cwt. sulphate of ammonia — per acre.
1 cwt. sulphate of potash

6. Tomatoes—

4 cwt. bonedust
$\frac{3}{4}$ cwt. sulphate of ammonia — per acre.
1 cwt. sulphate of potash

7. Small Fruits: Currants, Gooseberries, Raspberries, Strawberries—

5 cwt. superphosphate
$1\frac{1}{2}$ cwt. sulphate of ammonia — per acre.
2 cwt. sulphate of potash

ROOT CROPS.

1. Beets and Mangolds—

4 cwt. superphosphate
4 cwt. kainit — per acre.

2. Turnips and Rape—

3 to 4 cwt. complete turnip manure (any kind)
$\frac{3}{4}$ to 1 cwt. sulphate of potash — per acre.

The above are more applicable to New Zealand.

3. Potatoes and Onions—

4 cwt. superphosphate 1 cwt. sulphate of ammonia 1½ cwt. sulphate of potash	per acre.

Under some conditions, onions benefit more from the use of muriate than from sulphate of potash.

VEGETABLES—IN AUSTRALIA AND NEW ZEALAND.

1. Cabbage, Cauliflower, Rape, and Green Vegetables generally—

2 cwt. superphosphate 1 cwt. sulphate of ammonia 3 cwt. kainit	per acre.

2. Asparagus, Celery, Spinach, and Vegetables other than Brassicæ—

3 cwt. superphosphate 1½ cwt. sulphate of ammonia 1½ cwt. muriate of potash, or 4 cwt. kainit	per acre.

3. Melons, Pumpkins, Marrows, Cucumbers—

3 cwt. superphosphate 1½ cwt. sulphate of ammonia 1½ cwt. sulphate of potash	per acre.

These crops will do well with this fertiliser on the lightest soils.

TROPICAL CULTURE CROPS.

1. Cocoa, Cocoanut, Coffee, Cotton, Rubber, Sugar-cane, Tea, &c.—

These crops, apart from sugar-cane and cotton, at present are scarcely grown in Australia. They require heavy fertilising, particularly of potash, and some can only be grown under distinctly tropical conditions of heat and moisture. [Cotton, coffee, and sugar-cane are also grown under temperate conditions of climate in Queensland.—Ed. "Q.A.J."] An average fertiliser would be represented by—

3 cwt. superphosphate 1½ sulphate of ammonia 2 cwt. sulphate or muriate of potash	per acre.

2. Bananas—

3 cwt. superphosphate 1½ sulphate of ammonia 2 cwt. sulphate of potash	per acre

may be applied twice annually at the close of each rainy season.

3. Pineapples—

2 cwt. superphosphate 1½ cwt. sulphate of potash 1½ cwt. sulphate of ammonia	per acre.

DRY FARMING PRINCIPLES.

From evidence given by practical farmers engaged in dry farming throughout the State of Wyoming, U.S.A., in response to letters addressed to them by the authorities of the Wyoming University and Agricultural Experiment Station, it would appear that, with the employment of proper methods, combined in a measure with stock-raising, dry farming is a profitable enterprise. In that State there are over 14,000,000 acres of land with a rainfall of over 15 in. per annum. There are nearly 30,000,000 acres with

an annual precipitation of between 12½ and 15 in. All the arable land in these areas will grow profitable crops by dry farming in a majority of seasons. Then there are nearly 19,000,000 acres, of which probably one-half receives less than 10 in. of rainfall.

Under the most favourable conditions, crops have been successfully grown on a precipitation of less than 10 in., but still it would be hazardous for a settler to venture much in the hope of gaining a livelihood on a 320-acre homestead when he knew that 10 in. per annum was the average, and that in one-half the seasons it would fall short of that amount.

Total annual precipitation is no conclusive guide in locating districts where dry-land farming can be successfully practised. The quantity and character of rainfall during the growing seasons, together with altitude, length of season, amount and severity of wind, hail storms, early and late frosts, are all factors which contribute to the solution of the question. The heavy dews which frequently occur in Queensland would also be a factor in this State. Now, as to the "Principles of Dry Farming," the first to be considered is—

Ploughing.—From the evidence abovementioned, there seems to be no question of the desirability of having the ploughing done some considerable period before the time of planting, and that the land should be so handled during the fallow period as to render it capable of taking up and holding every particle of moisture possible. Autumn ploughing is recommended, where it can be practised, for spring crops and for seeding the following autumn. Whenever autumn ploughing is done, the ground should be left as rough as it can be, in order that it may catch the snow (that is in Wyoming). For summer tilling, land ploughed in autumn is better; but a summer-tilled ground for an autumn-sown crop may be ploughed early in spring. Where possible, a depth of 8 in. should be maintained, while some advocate ploughing 10 in.

Harrowing.—As a rule, all land should be harrowed almost immediately after it is ploughed, the only exception being autumn-ploughed land, which should lie rough during the winter. As a rule, summer-tilled land should be ploughed after each shower of heavy rain, especially when the storm has compacted the soil in any degree. The harrow should be used on cereal grains in the spring and on cultivated crops, should the ground become encrusted before the crop is sufficiently far advanced to cultivate. The disc or lucerne harrow should be used on permanent meadows and lucerne fields early in the growing season to aerate the soil and mellow the surface to as great an extent as possible.

The Roller.—The roller and the sub-surface packer are valuable implements in the hands of the dry farmer, if used with caution. The ordinary smooth roller should be discarded for the corrugated roller, which serves to pack the ground; at the same time it leaves a roughened surface from which the moisture does not readily evaporate. The sub-surface packer performs the same kind of work, and, on fresh-ploughed, mellow soil, may be more desirable. The corrugated roller serves many purposes, and does not leave the hard, smooth surface which seems to encourage rapid evaporation.

Weeder.—The must useful of implements for rapid work in light cultivation is the weeder. This cultivates the surface of the ground to a depth of 1 or 2 in., is operated very easily, and one team can cultivate a large surface in a short space of time. It is practically a light harrow, and does the work much more cheaply than the ordinary harrow, wherever the ground is in such condition that the weeder will penetrate the ground to the necessary depth. For the cultivation of cereal crops, the first process would naturally be to harrow with the ordinary spike-tooth harrow. Following this, one or two cultivations should be made with the weeder, which may operate on fields of grain until the growth is 1 ft. or more in height. It serves to preserve the soil mulch, break the crust, and promote ventilation.

Drills and Seeding.—While all the reports mentioned indicate that a variety of drills have proved successful, it is universally conceded that some form of press drill is necessary to get the best results from dry-land farming. Any means whereby the soil is well compacted around the seed produces the desired result. Rolling the land, however, should be followed by the harrow or weeder, in order that the surface may be roughened and evaporation checked. Where one is compelled to sow broadcast, the corrugated roller is recommended. Even the ordinary smooth roller may be employed to compact the ground after seeding, but the process should be followed at once by some sort of light cultivation.

Crops.—The dry farmer, more than the humid or irrigation farmer, must select and grow crops adapted to his local conditions. The developing of varieties capable of contending with aridity is progressing rapidly. Rotating of crops, conserving and utilising of farm manures, and maintaining a full complement of live stock are essentials to the highest degree of success in dry-land farming. Some of the crops which have demonstrated their adaptability to Wyoming dry-land conditions are—Beardless Barley, Macaroni Wheat, Turkey Red Winter Wheat, Winter and Spring Ryes, Oats, Spelt, Broom Grass, Lucerne, Potatoes, Sugar Beets, and, in the lower latitudes, Indian Corn and Milo Maize.

GENERAL CONCLUSIONS.

The dry-land farmer must continually bear in mind that, in order to succeed, he must study the physical characteristics of his soil, and take advantage of every possible means of conserving all the moisture that falls, whether it comes during the preparation of the land for seeding, during the growing period of the crop, or after a crop has been harvested. The foundation principle of conservation of moisture is to provide and maintain at the surface a layer of loose soil, which serves to prevent the escape of moisture by evaporation. In the majority of cases it will be necessary to conserve the moisture of two seasons for a single crop; and early, deep ploughing, summer tilling of the land, and so arranging the crops that two seasons' rainfall will be largely utilised for each crop, are the means of securing the desired results. The dry-land farmer cannot afford to be at all careless about any of these operations. He should also remember that every weed allowed to grow in his cultivated crops saps its proportion of the moisture from the land, and thus robs him of a portion of his just dues.

THE OUTLOOK FOR COTTON PLANTERS.

That the present consumption of cotton and the steady increase in the number of cotton mills and spindles in the United States and in Europe are not and cannot yet be met by the present supply or that in the near future can be shown by reference to authentic statistics on the subject. For the raw material manufactured in Great Britain that country is dependent upon America for 75 per cent. of her requirements, the balance coming from India, Egypt, Africa, the West Indies, &c. Mr. J. Stewart J. McCall, Director of Agriculture in Nyasaland, British Central Africa, has written a most interesting pamphlet on the subject of "Cotton Cultivation and its Extension in Ceylon," which is published by the Royal Botanic Gardens authorities, Ceylon. This pamphlet is one that should be carefully read and pondered over by Queensland farmers, because, as we have frequently pointed out, they have everything in their favour for the production of vast quantities of superior Uplands and Sea Island cotton—in climate, soil, rainfall, facilities for transport, cheap freights, immunity from serious insect pests and disease, &c. It

has been stated in the last annual report of the British Cotton-growing Association that "cotton-growing in Queensland continues to make some progress, but it is feared that the regulations as to labour will prevent this colony ever becoming a factor in the cotton supply of the world." This is a pessimistic statement which is contradicted by facts. The labour element does not enter into the question of profitable or unprofitable cotton-growing in the State. Wherever cotton is growing here, pickers are found who will pick from 100 lb. to 200 lb. of cotton daily at ½d. per lb., and at this rate of pay the grower makes a better profit than from most other crops, and the pickers average from 4s. 2d. to 8s. 4d. per day. As to the cost of cultivation, it is less than that required for maize, potatoes, or sugar-cane; and all these require more handling at harvest time and heavier labour than does the cotton crop. Queensland will yet be a big "factor in the cotton supply of the world," as the Cotton-growing Association would long since have discovered had they extended their operations to this State, and expended, say, £10,000 in advances to planters. It should not be forgotten that the Federal Government pay a bounty of 10 per cent. on clean cotton exported from the State, thus affording another inducement to growers here to increase the area under the easily-grown crop.

To return to Mr. McCall's *brôchure*. That gentleman writes:—

"The developing of new cotton-fields throughout the British world and the broadening of the basis of supply is the most important economic problem of British tropical and sub-tropical agriculture. This imperial question and its solution is the success or failure of the largest export trade of the world, the very backbone of British commerce. It has been estimated by Mr. Macara, the great authority on cotton statistics, that no less than 3,000,000 people at home are directly dependent for their livelihood on this industry; and, further, that 10,000,000 of the inhabitants of Great Britain are directly or indirectly connected with cotton in trade.

"Everyone who is acquainted with cotton knows that the industry is in a very precarious condition, as the consumption is increasing more rapidly than the production.

"At the present day Great Britain, with all her colonies, is dependent on America for 75 per cent. of her raw cotton; should the American crop fail, the result would be fatal to the trade of the world, and spell starvation to millions of people in Great Britain.

"America will have less cotton for export than she has at present, as her consumption of raw cotton is increasing and likely to increase with her population.

"Mr. J. Arthur Hutton, chairman of the British Cotton-growing Association, addressing a deputation to the late Prime Minister, Sir Henry Campbell Bannerman, in May, 1906, said:—'Four hundred thousand bales (500 lb. each) is the average increase in the world's consumption every year. Lancashire alone, in the last two years, has added something like six million to her spindles, which means an increase in consumption of half a million bales, apart from the increased demands in other parts of the world.'

"Considering that the average yield in America is something under 200 lb. per acre, it is obvious that Lancashire alone requires for her increased consumption of the last two years the cotton from 1,250,000 acres.

"When we add to Mr. Hutton's remarks the fact that the Cotton Weevil *(Anthonomis grandis)* is making it impossible to grow cotton in many districts of Texas and Mississippi, and as the pest is spreading with almost arithmetical accuracy at the rate of 50 miles annually north and east, it is a matter of time till the whole cotton belt of America is infected, and the yield reduced by at least 25 per cent.

"The writer, having visited 3,000 miles of the cotton States this summer, can add his testimony to the long list of those who advocate the growing of cotton in every suitable corner of the British Empire, and trusts that this report will receive consideration and help to solve the problems connected with cotton cultivation in Ceylon."

Mr. McCall then goes on to apply his remarks to cotton-growing in the dry regions of Ceylon, and they apply with equal force to cotton-growing in the dry regions in the West of Queensland, where the soil is ideal for cotton-growing, and where there are boundless facilities for irrigation. One remark the writer makes will fairly well apply to our Queensland farmers—viz., "Cotton-growing has never been extensive in Ceylon, but this is probably due to the temperament of the people more than to the unsuitability of the crop to the soil and climate." Of course, here he alludes to the temperament of the native cultivators. Our Queensland farmers are conservative. They do so well with dairying, sugar-growing, wheat culture, and other industries that they are hard to move into any new experiments, in spite of the fact that cotton-growing has years ago passed the experimental stage in this State. We have also millions of acres of uncultivated land in Queensland, where all the cotton required for the world's supply could be raised, had we but a large population. "But," says Mr. McCall, "the day is past when we, as a nation, can afford to leave acres of land in jungle, which is capable of growing such a valuable crop as cotton; and if the indigenous labour is unwilling, the solution lies in the minimising of labour with machinery and the introduction of imported labour from India."

The solution with us in Queensland, since we already have in general use the most up-to-date agricultural machinery, is the importation of thousands of people from Great Britain and Germany, all with a little capital sufficient to enable them to enter upon the cultivation of the land, and being afforded some assistance through the Agricultural Bank, as is now done in advances to settlers by that institution. If this could be accomplished, the great cotton-producing centre might be transferred from America to Queensland. Mr. McCall deprecates for Ceylon the continuance of growing Indian varieties, which serve no imperial purpose, and are unprofitable to growers. (The Indian cottons were given up in 1904.) Indian cottons are of too low quality for the British market, and very little Indian cotton is used in Lancashire, two-thirds of the quantity exported from India going to Japan.

The sole aim of cotton-growing should be to cultivate exclusively the varieties suitable for supplying the demands of the British cotton market. The cultivation of the Egyptian cotton is particularly recommended, as it commands practically double the price of Uplands.

Referring to Sea Island cotton, which is a most valuable crop, the writer considers it unsuitable for the heavy soils of some districts of Ceylon, and suggests growing it experimentally in proximity to the sea. This tallies exactly with what has been proved in connection with Sea Island and Caravonica in Queensland. We note, however, that no mention is made of the latter hybrid long-staple variety in the whole pamphlet.

The following extract from Sir George Watt's book on "The Wild and Cultivated Cotton Plants of the World" shows very clearly the position of the Sea Island cotton in commerce:—

"It is even now a special crop that can be produced only in a very restricted area, and for which there is not likely ever to arise a very much larger demand than at present. It can at all events alone pay when a higher price rules; *extended production* is, therefore, exposed to the danger of the ruinous reduction of price."

From the above it is clearly seen that Sea Island cotton is not wanted in large quantities, and, as it is a much smaller cropper even under ideal climatic and soil conditions, it is not likely to be a profitable crop for Ceylon.

It is distinctly encouraging to know that Egyptian cotton grows in Ceylon, as the Americans have failed to produce Egyptian cotton through the Southern States, the summer being too short to mature the crop. There is an increasing demand for this class of staple throughout the world, and in 1907 America imported 16,000,000 dollars' worth of cotton direct from Egypt; the average price was 10½d. per lb.—nearly double the price of American Upland.

Egyptian cotton has a special quality—viz., colour—an even brown cotton always bringing the highest price; this quality is difficult to maintain out of Egypt, but most of the difficulties connected with the establishing of a fixed type can be overcome by selection.

Egyptian cotton usually becomes very arboraceous in the first two or three years of its introduction, but after acclimatisation it decreases its height and increases its fruits.

Cotton is not an exhaustive crop like maize, sugar, or sesamum, and can be grown for many years on the same soil if manured; this has been demonstrated in parts of the United States, where cotton has been grown for forty years on the same land, producing a crop throughout the entire period without diminishing.

It is always advisable to have a rising temperature until the cotton flowers, with two hot dry months for harvesting; and this can only be obtained by sowing in February in Ceylon, October in Queensland. The land should be ploughed at least one month before sowing.

Manures.—It has been proved that nitrogen from an organic source forms the best basis on which to construct a cotton manure, and in Egypt the source of organic nitrogen is largely Bersim Clover *(Trifolium alexandrinum)*.

In newly-opened jungle land it is not necessary to add organic nitrogen, as an adequate supply exists in the decaying timber and roots.

This to a large extent disappears after four or five crops have been taken from the soil, when it *may* be advisable to return organic nitrogen to the soil, and the most economical way to do this is by ploughing under leguminous crops, such as Crotalaria and Bersim or cotton seed, which contains much nitrogen.

This must always be ploughed under at least one month before sowing the cotton crop in February (in Ceylon), or it will retard germination.

On newly-cleared land the writer would strongly advise the use of 2½ cwt. of basic slag per acre; this should be applied broadcast at the last cultivation before setting up the ridges for planting, and will check rank growth and increase fruiting capacity.

It may be found advisable after growing cotton for three or four years to apply a mixture of 75 lb. of nitrate of soda and 60 lb. of ammonium sulphate per acre, in addition to the basic slag, but this need not be applied during the first three years of its cultivation.

The effects of manure may be tried experimentally on the station, and the public advised on these results.

Artificials have proved very profitable in Egpyt and America when judiciously applied to cotton.

The ploughing should be deep and the land left exposed for three weeks or a month, then cultivated by the cultivator or disc harrow, rolled, and set up in ridges 3 ft. apart.

A fine seed bed is necessary, which should be dry at the time of sowing, in order to secure a high percentage germination.

Planting.—To be completed in the first fortnight of February (September or October in this State.—Ed. "Q.A.J."), eight seeds in each hole on top of ridges 3 ft. apart, 15 in. between holes, the height of the ridge being 12 in., quantity of seed required 45 lb. per acre.

Irrigation.—Considering there is some rain during the summer months, it is difficult to lay down stated periods between the irrigations, as is the practice in an arid country like Egypt, where there is no rain during the cotton-growing season. The writer considers that 20 in. of water per acre would be sufficient to supplement the rain, and this is equal to less than one-third of the water considered necessary for irrigating an acre of village paddy.

The first irrigation must be given immediately after the seed is sown, and should be the heaviest, amounting to about 4 in. per acre.

It is advisable not to apply water until the expiry of at least 45 days after the first watering, in order to encourage deep rooting; the roots follow the water into the soil.

From this period till flowering the crop may require irrigating every 25 to 35 days, depending on the weather, and after flowering the irrigations should be fewer; no water being given for at least one week before picking.

A small irrigation after each picking is beneficial, as it opens the bolls.

One of the chief precautions is not to over-water the crop or to allow the water to rise above the point where the stem of the plant comes out of the ridge.

Thinning and After-tillage.—Under ordinary conditions (we are quoting Mr. McColl) the plants are above ground in eight to ten days after sowing; on the tenth day, extra seed should be soaked, and all places resown where seed has not germinated. Immediately before the second irrigation, the cotton should be thinned by hand, leaving two plants in each hole. Weeds should be killed at the same time with a drill cultivator, and the soil loosened round the plants.

It will be found necessary to repeat this cultivation every fifteen to twenty days until the plants meet in the drills (*i.e.*, two to two and a-half months after sowing). After the plants meet, owing to the danger of breaking the branches, tillage should cease, and cotton, after this stage, will keep the weeds in check by overshadowing them; the only attention required from this period to harvest time is an occasional hand-weeding to remove any conspicuous tall weeds. Immediately before discontinuing tillage, it is advisable to finally set up the ridges with a ridging plough to facilitate irrigation.

Hindi or Egyptian Weed Cotton.—This is the old indigenous cotton of Egypt, and is found in all samples of imported Egyptian seed, and must be eradicated, as it greatly affects the value of the staple. Fortunately this cotton is easily distinguished. The sketch accompanying shows differences in the seed, and in the plants when about a month old. The fibre from Hindi is short, white, harsh, and brittle; whereas the fibre of Mit-Afiffi Egyptian is brown, long, silky, and strong.

VARIETIES OF EGYPTIAN COTTON.

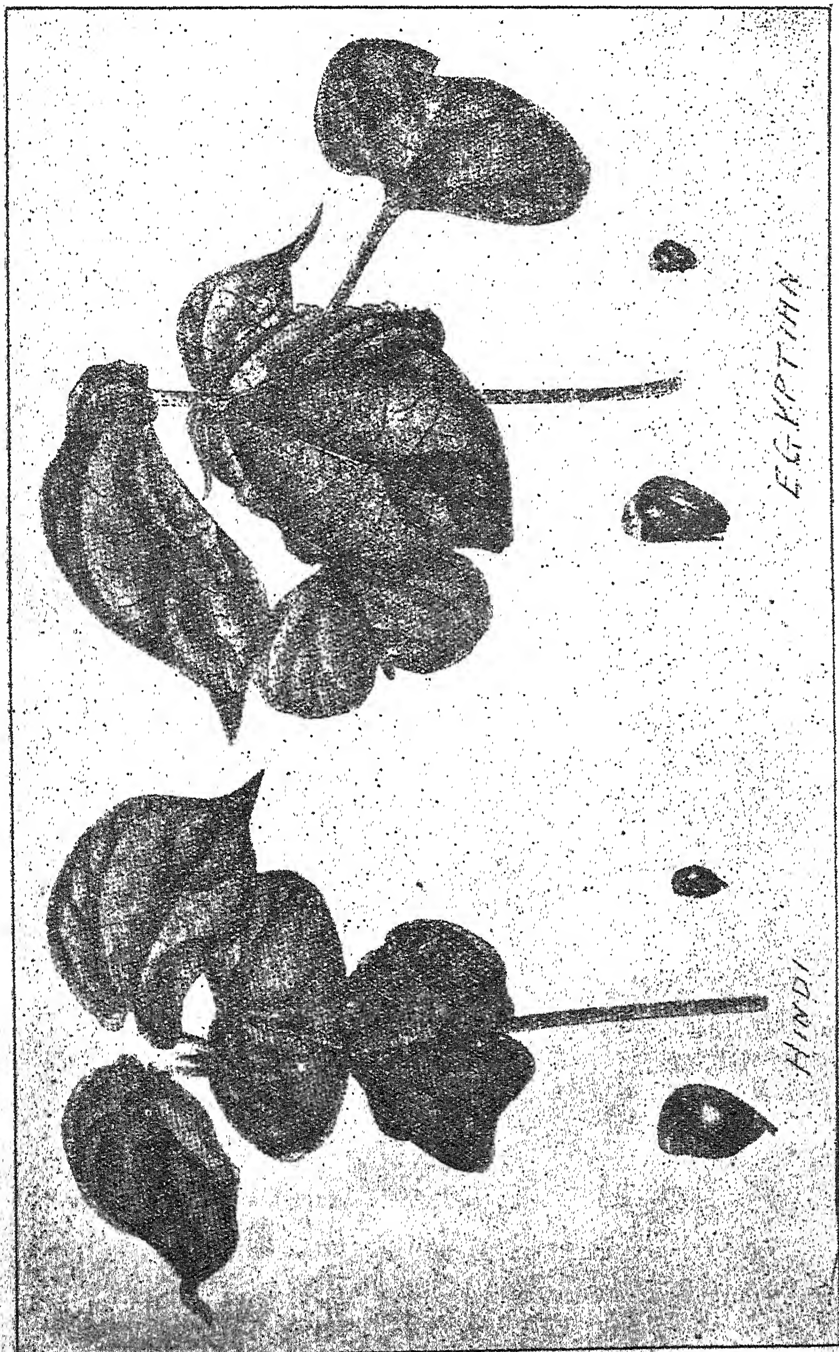
(1) Mit-Afiffi, (2) Abbassi, (3) Jannovitch, (4) Ashmouni, (5) Nubari.

The Abbassi is the only white Egyptian cotton, the other varieties having brown tints. Jannovitch most nearly approaches Sea Island cotton; it is the most speculative to grow, but the most valuable. Ashmouni is a small variety, stands most heat, and hence principally cultivated in Fayoum and Upper Egypt, but of less value than other Egyptian varieties. Nubari is a new variety similar to Mit-Afiffi, and popular with the Manchester spinners.

Harvesting.—The crop should be picked three times and the sticks uprooted and burnt.

The three pickings should be kept and ginned separately. The first is the most valuable.

Cotton should be ready to pick by the middle of August (in Ceylon), and it is advisable to have about 45 per cent. of the crop in the first picking, as it is the most valuable; the second picking should be ready three weeks after the first, and by the end of September the crop may be pulled out after taking the third picking.



Picking at the Experiment Station costs Rs. 1 (1s. 4d.) per 100 lb. seed cotton (*i.e.*, fibre and seed), whereas in America it costs 75 cents (3s. 1½d.) American (or fully double), and in Egypt 10 piastres (2s.) for the same quantity. An average boy should pick 60 lb. a day. [In Queensland, last season, a man picked nearly 300 lb. in a day.—Ed. "Q.A.J."] Mr. McCall sets down the cost of tillage operations in the North-Central Province of Ceylon as follows:—Ploughing, Rs. 5 (6s. 8d.) per acre; cultivating, 60 cents (about 1s.); ridging, Rs. 2 (2s. 8d.) per acre; drill cultivating, 60 cents (about 1s.) per acre.

Labour.—Local, irregular, village woman labour can be obtained for 30 cents (about 6d.), and estate labour on an average of 43 cents (about 7½d.) per day.

Cost of Clearing Land in Ceylon.—Clearing and stumping thoroughly, Rs. 50 per acre (about £3 6s. 6d.); or all trees under 12 in. cut and burnt, at Rs. 25 (about 33s.).

Cotton has a distinct advantage over tea and rubber, in the fact that returns can be obtained immediately after clearing, as the crop only occupies the land for seven months.

Assuming that the crop return is 300 lb. of fibre per acre at 8d. per lb., which in the writer's opinion is a low estimate, the profit should at least be £4 10s. per acre, reckoning the cost of actual tillage and harvesting (not including ginning, baling, transport, and shipping) at Rs. 50 per acre (£3 6s. 8d.).

The amount of capital required to take up land depends to a large extent on the value put on the land by the Government, but this matter is outside the sphere of this report; the above figures are based on an assumption of Rs. 20 (£1 6s. 8d.) per acre, and a water tax of Rs. 2 (2s. 8d.). In Egypt average land produces 500 lb. of fibre per acre, but there is much capital invested, as land is valued at least at £40 per acre. In America, with black labour at 1 dollar per day and an average yield of 200 lb. of lint, the land is valued at £2 10s. per acre, and the whole cotton belt, which has only 7 per cent. under cotton, at £1 5s.

In conclusion, the writer prognosticates a great future for cotton in the dry zones of Ceylon during the warm season (provided the water is conserved and distributed to the many acres of fertile land, which are at present largely covered by jungle), when it is considered that there is at present something approaching 200,000 acres of irrigable land, and many other acres which could be brought under irrigation without interfering with the present cultivations, there being only 75,000 acres under cultivation and over 2,000,000 acres in the North-Central Province alone awaiting the plough.

HOW TO MAKE COTTON-GROWING PAY IN SANDY SOILS.

In 1906 a Bulletin, No. 7, was issued from the Tuskegee Agricultural Experiment Station, U.S.A., by the Director of Agriculture, Mr. G. W. Carver, M.S., in which he maintained that every acre in Alabama, capable of growing cotton, could and should be made to produce a bale of ginned cotton to the acre. We have long since taken the same position with regard to the productive capabilities of Queensland cotton soils; and, where due care has been exercised in the selection of seed, season of sowing, preparation

of the ground, depth of ploughing, proper distances between the plants, after cultivation, and the boll worm has been absent, this contention has been more than borne out. In the case of Uplands cotton, in the Southern and Central districts, over 2,000 lb. of seed cotton have been obtained per acre; and in the North, the Caravonica cotton has given a far greater yield.

In Tuskegee the director's assertion has been amply borne out also, as the Alabama lands have averaged 20 lb. of ginned cotton over and above the 500-lb. bale per acre. Now, several points in the cultivation of cotton presented by Mr. Carver are deserving of the attention of Queensland cotton-growers. They are—

Preparation of the Soil.

In this many farmers fail. They fail, first, because they do not turn their land as soon as the crop is off; second, they do not plough deep enough.

Advantages.

(1.) Deep ploughing (which should be from 8 to 9 in.) brings to the surface plant food that the rain and other agencies have carried beyond the reach of the feeding roots of the average farm crop.

(2.) If the ploughing is properly done, it puts the cotton stalks, leaves, grass, &c., underneath where it decays, and the non-available plant food becomes available, and the humus is in the very best possible condition to perform its most important double duty as an absorbent of the soluble plant food and an improver of the soil's physical condition.

(3.) Ploughing in autumn (or in the early winter in Queensland) destroys many insects which deposit their eggs in the stems of weeds, upon leaves, under clods, or just a few inches under the surface, by putting them deep down under the earth, where they drown out or smother. Those which Nature intended should be buried deep in the earth for protection are brought to the surface, where many freeze, others become food for the birds, while still others perish by having their natural homes broken up; thus greatly reducing the number of injurious insects. The same can be said of the rusts, smuts, anthracnose, and many other spot diseases.

(4.) Deep ploughing increases the water-holding capacity of the soil, greatly reducing injurious washing; it also helps to mix the soil by quickly softening the more friable portions and allowing it to percolate into the cracks made by the ploughing process.

(5.) It permits the wind, water, air, sunlight, earthworms, bacteria, moulds, ferments, and other plant, animal, and mineral agencies to better perform their work of soil-building.

Things to Bear in Mind.

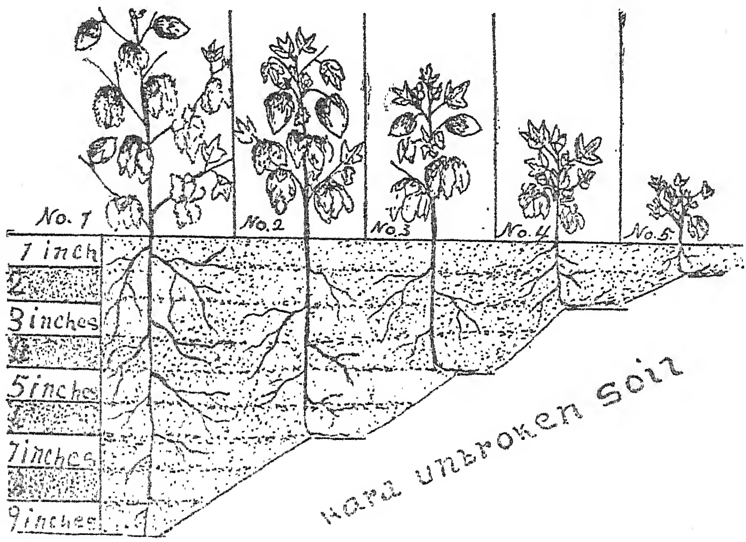
That all preparation or tillage should be done when the soil crumbles the easiest, and does not ball up into a sticky mass when pressed in the hand.

That 9-in. ploughing and upward is the end desired, but must be done gradually on our thinnest soils unless we have plenty of barnyard manure or its equivalent in vegetable matter, supplemented by the proper commercial fertilisers.

That it will pay you to plough this land, quite shallow (3 or 4 in.), first after broadcasting a liberal coating of stable manure, leaves, muck, &c., upon it; plough this under 4 in. Run over it several times with a disc harrow until thoroughly cut up. Spread on another layer of manure as thick as the

first, turn 4 in. deeper, which will make 8 in. in all; harrow in the same way. Put the commercial fertilisers in the drill, as usual. If this has been thoroughly done, a good crop may be expected. This soil can be deepened to advantage a little more next year.

Not only is the soil affected by deep and shallow preparation, but the growth and fruiting power of the plant are improved, as is shown in the diagram.



This cut is drawn to illustrate an experiment conducted on the Tuskegee experiment farm.

Some typical worn-out soil was selected and divided off into five plots. No. 1 was ploughed and thoroughly pulverised by repeated ploughings and harrowings until the soil was fine and mellow to a depth of 9 in.; Nos. 2, 3, 4, and 5, respectively, in the same way, to the depths as indicated—viz., 6 in., 4 in., 2 in., and 1 in.

No fertiliser of any kind was used on these plots, the object being to study or demonstrate the exact effect of deep and shallow preparation of the land upon the cotton plant.

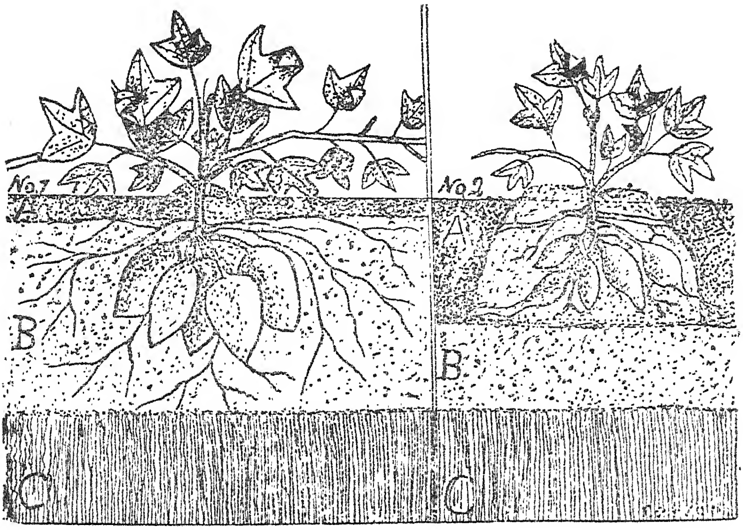
The cut needs but little explanation. Stalk 1 has splendid root growth, the tap root extending through the 9 in. of mellow soil, and is abundantly supplied with vigorous laterals or feeders. This stalk matured 12 bolls.

In No. 2 the taproot strikes the hard ground and turns at 6 in. The laterals are noticeably fewer in number, and this stalk only matured six bolls. No. 3 speaks for itself. The tap root struck hard ground, and turned at 4 in.; but few laterals are noticeable. Four bolls represented the crop.

The tap root of No. 4 struck hard ground at 2 in., and made a desperate struggle to live, but the odds were against it. It could only mature two bolls. No comments are needed on No. 5. It did well to mature its one little boll.

Comparison with the Sweet Potato.

As it was considered that a sweet potato plot would still better illustrate the point, because the roots could be more plainly seen, it was used as well. The effects of deep cultivation and preparation of the soil are clearly shown in Cut 2.



In this cut is shown a hill of potatoes from plots 1 and 2. No. 1 shows a mulch of very fine soil produced by 2-in. cultivation which is so essential in light, sandy soils, which are naturally very thirsty. Note that the feeding roots are not disturbed, and extend down 9 in. to the water-bearing subsoil. Here we see a vigorous growth of vine, splendid root power, and a good yield of fine, large potatoes.

In Plot 2 we did as many farmers do—cultivated deep, went down 5 and 6 in., cutting the feeding roots, and greatly reducing the yield of potatoes.

Aside from the above, this was significant: That, despite the very dry season, Plot 1 grew and flourished throughout the entire season, and did not seem to suffer for want of water, while No. 2 suffered greatly, losing most of its leaves.

Exactly the same was true of the cotton plots. The dust mulch preserved the water, undisturbed the feeding roots, and the plants held their leaves and continued to grow, bloom, and set bolls until frost. Neither leaves nor bolls were seriously affected by the anthracnose, rust, or other spot diseases.

Another important point for the farmer to keep in mind is the fact that all plant foods in the soil are rendered non-available or worthless to the plant unless there is sufficient water in the soil to properly dissolve and distribute them. Hence, in the thirsty soils, it is doubly necessary that the cultivation be done in such a manner as to save the water. (*See* Cut 2.)

Cotton is a typical, taprooted plant, made to go deep into the soil, for both water and plant food, but the many decades of soil skimming—*e.g.*, poor seed selection and bad cultivation—have dwarfed both root and top and produced a plant that has lost much of its original characteristics. It has been so lowered in vitality that the roots, stems, leaves, and bolls are all subject to a large number of destructive diseases.

Aside from the tap root going deep into the ground of well-prepared soil, it throws out numerous laterals, often 4 and 5 ft. in length, the largest of which, as a rule, are just below the surface of the ground; hence the wisdom of shallow cultivation.

Thus it will be seen that, after the correct preparation of the soil, the selection of good seed, the proper fertilisation and planting, comes "tillage," which is none the less important, as Cut 2 plainly shows.

During the course of the experiments the weather generally was cold and wet. Several heavy frosts in April killed off the cotton, much of which had to

be re-planted. In August the excessively dry weather caused the cotton to shed and rust badly. Notwithstanding these trying conditions, the station was able to make, from 6 acres of land, four 500-lb. bales, plus 43 lb. At 6d. per lb., this was equal to £8 10s. per acre.

One is able to appreciate the value of this yield when he recalls the fact that less than ten years ago this piece of land would not successfully grow even a satisfactory crop of cow-peas; 250 lb. of potash, phosphate, and nitrate of soda were used per acre, as follows:—100 lb. of acid phosphate and the same amount of muriate of potash, plus 25 lb. of nitrate of soda, were thoroughly mixed and put into the drill, followed by a small scooter which served as a mixer; the seed were then planted as usual.

After chopping and just before "squares" began to form, the remaining 25 lb. of nitrate of soda was applied as a top dressing, just after a light shower of rain, great care being exercised to get the small amount evenly distributed over the acre.

Much of the success of last year's crop is due to the persistent ploughing up, planting over, and replanting; this was done up to the 3rd of July (and that planted so late made a fair crop).

From year to year the following facts became more and more apparent:—(1) That the proper preparation of the land; (2) the proper fertilisation; (3) the proper selection of seed; (4) and the proper cultivation of the crop, are all fundamentally essential in the production of a good crop of cotton. It further emphasises the fact that our light, sandy, worn-out soils can be reclaimed and made to yield paying crops of cotton.

SEED DRILLS.

There are men living who can remember when the first corn drill was started in their own district, and when it was as much a wonder as the agricultural motor now is. Of course, they had been in use for some years in some districts; in fact, it is recorded that Joseph Locatilli, of Corinthia, introduced a crude machine in 1662, but nothing was made until 1783, when Cooke patented his drill, the forerunner of the modern drill, which was worth adopting. Salmon introduced the Bedfordshire drill in 1800, and Smyth the Suffolk drill about the same time, and it was these that placed drilling on a practical footing. One of these drills, compared with a modern one, was clumsy and poorly constructed, but marked sufficient advance for the disciples of Jethro Tull to welcome them warmly.

This old world had wagged its hundreds of thousands of years since man had required something to deposit seed quickly and accurately, and had to wait until our grandfathers' time to obtain it. A vast change has come over agricultural machinery since then: nearly every operation of the farm can now be done by machinery; drills in themselves have been improved, but even now drills lack one essential feature—a simple and effective steerage.

By far the best is that which Salmon introduced more than a century ago, but it is associated with a drill of heavy draught and one requiring some skill to ensure regular depth of seeding. There is also the fore-carriage steerage, which a highly skilled man can steer with steadiness on a smooth seed bed, but the meanderings of most work done by it show that it is far from meeting ordinary requirements.

A CHANCE FOR THE INVENTOR.

When one looks at a modern drill one wonders why the mechanical advantages given to the operator of other implements and machines are not provided on the drill. It may be because many of the modifications which have been introduced have been made by American and colonial makers, who have to

provide a simple drill for their home agriculture; and English makers seem satisfied to utilise their inventions without troubling to suit our own. Why a man should not be able to ride on a drill and operate a few parts, while a man on a binder has so many to look after, seems strange. Wake up, England! Surely a good steerage might be provided that could easily be worked by the feet, if a hand cannot be spared, to correct the inaccuracies of driving; and all other points, such as regulating the depth, might be conveniently worked by other levers. The adoption of a modification of the motor-car steerage ought not to be a great difficulty. Three men—we sometimes set four—and four horses, making a funeral procession to bury wheat, drilling about as straight as an Irishman [or any other man—Ed. "Q.A.J."] walks after a prolonged wake, is not good enough for the twentieth century, and wheat at less than 5s. a bushel. The American maker won't provide us with something up to date, and the English maker apparently can't. Where is the successor to Salmon, who, at any rate, did provide a good steerage a century ago? He is wanted.

DIFFICULTY OF STEERING.

Considering how difficult it is to steer the drill with accuracy, and that, even with good steerage, only the very highly skilled can make the first draught across a field even decently straight, it is extraordinary that a line is not laid down as a guide, but we have never seen it done. It may be pride on the part of the drill man that prevents it, but it is very foolish for a farmer to allow an unskilled man to do bad work on such grounds. Moreover, if most men get a good start, it takes them all their time to keep straight, and where it is intended to horse-hoe subsequently it would be far better if the farmer insisted upon it, and if the man cannot keep straight far over the field to make him lay down the cord again. There would be far less inaccurate drilling if this were done. It seems almost superfluous at sight to say that the coulters should be set exactly at the required distance apart, but if one takes a measure into the field one will find far more inaccuracies in this respect than one would think possible, except where the master keeps a very close and proper oversight of what is going on.—"Agricultural Gazette."

DRY SCAB OF POTATOES.

A recently issued number of the Kew Bulletin, No. 1, 1909 (says the "Journal of the Board of Agriculture"), reported the discovery in Great Britain of three cases of the potato disease known as "dry scab." During the month of April two further cases have come under the board's notice from Perthshire. This disease, which has till recently been known under the scientific name of *Phellomyces sclerotrophorus*, Frank, and is now called *Spondylocladium atrovirens*, Starz., has been known on the Continent since 1871, and in Ireland since 1903. The presence of this disease has not previously been confirmed in Great Britain, although a correspondent who sent up samples of diseased potatoes from the Isle of Ely, states that he had the disease rather badly five years ago. The disease appeared on Evergood potatoes, which were apparently quite clean when harvested, but in April they had so deteriorated that they fetched a very low price. As stated in the Kew Bulletin, the injury is confined to the tubers, and no indication of its presence is suggested by the foliage, which remains unaffected. The disease is revealed by the occurrence of blackish-olive or blackish-violet patches, which soon become depressed, below the general surface of the tuber, due to drying and breaking up of tissue. Very frequently only one or two such sunken areas, which vary from half an inch to an inch across, are present on a tuber. Portions of the skin readily peel off in flakes, and, if these remain in the

soil, they are a source of danger to future crops. But, although only a part of the potato appears to be diseased, it is certain, from the way the fungus appears, that parts that seem free are affected. It is, therefore, most dangerous to use or set any potatoes that show any signs of being affected.

Professor Johnson, who first recorded the presence of the disease in Ireland, made some attempt to find out whether, by soaking the tubers for an hour in a solution of formalin (0·8 per cent.), the disease could be eradicated. The result was apparently successful. At the same time he demonstrated the importance of preventive measures, by showing that perfectly healthy potatoes brought from France and planted in a district where disease is common became infected at once.

DISTANCES TRAVELLED IN PLOUGHING.

Whilst it is no great feat for a healthy man to walk a distance of 14 miles on a good road or through the bush, it is quite another matter when it comes to travelling the same distance in ploughing a field. Not many farmers give a thought to the distances travelled by their horses and themselves in ploughing an acre. In the case of a 7-in. furrow, the horses have to travel a distance of $14\frac{1}{2}$ miles. This is harder on them than doing 25 miles in a buggy, seeing that they are practically the whole time in the collar, with a heavy drag on. In cross-ploughing, a still larger area can be got over than in breaking up new land, and the distance is still further increased, whilst the uneven and softer ground makes walking still more laborious. Add to this that the weight of the shoes of a horse weighing 1,100 lb. is from 12 to 15 oz. each. The horse, taking about 4 ft. for each step, will, if 4 oz. be added to each shoe, lift 600 lb. in every mile, or nearly 5 tons in 15 miles. The ploughman, wearing $3\frac{1}{2}$ lb. boots, travelling, say, $9\frac{1}{4}$ miles, lifts over 16 tons of shoe leather in addition to the extra amount of dirt lifted. The energy required to do this is wasted, and serves no useful purpose. It only produces leg-weariness in man and beast. The shoes should, therefore, be as light as is consistent with the wear and tear they have to meet.

The following table will show the distances travelled by horses and man in ploughing 1 acre:—

Breadth of Furrow Slice. Inches.	Distance Travelled in Ploughing 1 Acre. Miles.
7	$14\frac{1}{2}$
8	$12\frac{1}{2}$
9	11
10	$9\frac{9}{10}$
11	9
12	$8\frac{1}{4}$
13	$7\frac{1}{2}$
14	7
15	$6\frac{1}{2}$
16	$6\frac{1}{6}$
17	$5\frac{3}{4}$
18	$5\frac{1}{2}$
19	$5\frac{1}{4}$
20	$4\frac{9}{10}$

Take the 7-in. furrow. In an acre there will be 360 furrows, each about 70 yards long = 25,200 yards. There being 1,760 yards in a mile, by dividing the whole distance travelled by 1,760, we arrive at $15\frac{1}{3}$ miles, about.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF MAY, 1909.

Number.	Cow's Name.	Breed.	Date of Calving.	Total Milk.	Average Test, Per cent.	Commercial Butter.	Remarks.
				Lb.		Lb.	
1	Honeycombe	Shorthorn ...	11 April, 1909	1,056	4·0	47·19	
2	Linda ...	Ayrshire ...	11 April ,,	1,092	3·4	41·02	
3	Beauty ...	,, ...	11 April ,,	973	3·7	36·62	
4	Lubra ...	Jersey-Ayrshire	5 April ,,	658	4·5	34·27	
5	Nellie II. ...	Shorthorn ...	1 Mar. ,,	715	4·1	32·78	
6	Butter ...	,, ...	20 Feb. ,,	740	3·7	30·46	
7	College Lass	Ayrshire ...	31 Jan. ,,	761	3·6	30·44	
8	Glen ...	Shorthorn ...	29 Jan. ,,	652	3·9	29·13	
9	Rosalie ...	Ayrshire... ...	10 Feb. ,,	678	3·5	26·31	
10	Conceit ...	,, ...	22 Nov., 1908	549	4·0	24·53	
11	Rosepetal ...	Shorthorn ...	7 May, 1909	645	3·6	25·80	
12	Laura ...	Ayrshire	16 Nov., 1908	593	3·4	24·40	
13	Careless ...	Jersey	7 Dec. ,,	495	4·0	22·12	
14	Whitefoot...	Holstein-Devon	20 Oct. ,,	486	4·0	21·71	
15	Blackbird ...	Grade Holstein ..	4 Feb., 1909	516	3·7	21·23	
16	Lady Ring	Guernsey ...	26 Jan. ,,	392	4·8	21·20	
17	Madge ...	Grade Holstein...	28 Dec., 1908	372	4·0	21·08	
18	Lydia ...	Ayrshire ...	23 Mar., 1909	517	3·6	20·68	
19	Rennet ...	Grade Holstein...	19 Mar. ,,	482	3·7	19·84	
20	Comet ...	Holstein	22 Nov., 1908	492	3·6	19·68	
21	Daisy ...	,, ...	24 Oct. ,,	539	3·3	19·64	
22	Gem ...	Grade Shorthorn	13 Dec. ,,	424	4·1	19·44	
23	Bangle ...	Shorthorn ...	23 Feb., 1909	418	4·1	19·16	
24	Dewdrop ...	Holstein	11 Nov., 1908	504	3·4	18·97	
25	No. 112 ...	Grade Guernsey	24 Nov. ,,	382	4·2	17·96	
26	Len ...	Ayrshire ...	6 May ,,	432	3·7	17·78	
27	Dora ...	Shorthorn ...	18 Nov. ,,	417	3·3	17·23	

Cows were fed on a daily ration of 30 lb. of green maize (chaffed).

THE REGISTRATION OF ANGORA GOATS.

Now that the rearing of Angora goats has become an established and a growing industry in Queensland it would appear that necessity has arisen for the protection of these valuable animals from the often well-merited doom of the common goat which wanders about highways and by-ways always on the alert to find an open gate by which it may gain access to somebody's garden. It is, however, not to be supposed that owners of Angoras would allow their flocks to stray about promiscuously, and so run the risk of having them destroyed. Still, if all Angoras were registered, two purposes would be served: First, the protection to accidentally straying animals; and, second, it would enable a purchaser to trace the lineage of an animal through flocks of reliable breeders to the original importation, which is the very essence of a register of live stock. We can trace the pedigree of horses and of horned stock very far back; and why should we not be able to do so in the case of such a valuable animal as the Angora? It is true that there is no registration in any country where Angoras are bred, except in England. George Fayette Thompson, M.S., of the United States Bureau of Animal Industry, in his excellent "Manual of Angora Goat Raising," says :—"There is no registration in the United States for milch goats of any breed. England has a registration, and, as any importations we may make for some years are likely to come from that country, it would be well if registration papers were secured of all goats and

held until such time as an association might be formed here." Of course he is referring here to milch goats as distinguished from the Angoras.

Wm. L. Black, of Texas, who wrote a most exhaustive book on "Raising the Angora Goat," says that an American Angora Goat Breeders' Association has been started in Kansas city, Mo., with the intention of inspecting such flocks as claim to be "thoroughbred" whenever the owners express a desire to have their goats registered, when a certificate will be given to them for such as come within the standard agreed on. It was not the intention of the association to deal with any peculiar "points" beyond a well-formed animal, having a fleece of pure mohair, evenly distributed over the body, particularly on the chest and belly.

Such points as shape of horns, character of fleece (whether wavy or in ringlets), length of staple, weight of carcase, &c., are considered to be of minor importance, and can only be controlled by a special association, which is recognised as being the only practical way to register "fancy points." But purity of blood is considered paramount to all others, and, as being to the best interests of all, that these should be registered in order to protect everyone interested in this new industry from the unscrupulous breeder, who will represent his stock as being pure when he has no right to do so.

In addition to this, the association, which is practically national in character, contemplates the general advancement of the industry throughout the United States by the collection of information, awarding premiums for excellence of breeding, &c.

The register is to be known as "The American Angora Goat Record," and is to be published annually in book form for free distribution.

Only breeders of good reputation and standing can become members of the association. The revenue derived from fees for registration is to be used for the general good of the industry, the actual expenses of the inspector and secretary, for labour performed, and for printing and stationery, &c., being the only expense that is to be paid out of the general fund.

The above was written about nine years ago, and we are not aware whether the association mentioned is still in existence, but of the value of such a society there can be no question. It is well known that the selection of the best of each generation and mating them have been the means of bringing all of our other fine classes of live stock up to the high standard of excellence they now enjoy; and it was, therefore, to be hoped that all breeders in the United States who are ambitious of seeing the Angora goat superior to all others in the world would unite with the association.

There are now in Queensland probably 6,000 Angora goats, and it would be well to start such an association in this State.

MILK TESTING WITHOUT APPARATUS.

Professor Gustave Michaud, Costa Rica State College, writes to "The Scientific American" of 24th April:—

"The following process for the detection of added water or of skimmed milk in ordinary milk is more accurate than the simple use of the lactodensimeter without the creamometer check. The whole test can be made in five minutes. The result does not show whether the adulteration consisted in the addition of water or in the subtraction of cream, but, as a rule, this matters little to the consumer. What he wants to know is whether or not he had what he paid for.

"The suspected milk is stirred with a spoon, in order to disseminate into the whole liquid the cream which may have come to the surface. Then, one volume of milk is poured into fifty volumes of water (1 fluid ounce of milk to 2½ pints of water). A candle is lighted in a dark room. The experimenter

takes an ordinary drinking glass with a tolerably flat and even bottom, and holds it right above the candle, at a distance of about 1 foot from it, so as to be able to see the flame of the candle through the bottom of the glass. He then pours slowly the diluted milk into the glass. The flame becomes less and less bright, as the level of the liquid rises in the glass. The flame is soon reduced to a dull white spot. A little more liquid slowly added, so as to avoid pouring in an excess, and the flame becomes absolutely invisible. All that remains to be done is to measure the height of the liquid in the glass, this being most conveniently ascertained by dipping into it a piece of cardboard, and then measuring the wet part. It should measure not over 1 in. if the milk is pure. With good quality milk, diluted and tested as stated, the depth will be about $\frac{7}{8}$ in. before the flame is lost to view. A mixture of one volume of milk and a half a volume of water should show a depth of $1\frac{1}{2}$ in. A depth of 2 in. indicates either partially skimmed milk or a mixture of one volume of good milk with one of water, and so on.

"The reader has already understood that the process is based upon the close relation between the opacity of milk and the number of fatty corpuscles contained in it. Both skimming and the adding of water work in the same direction—namely, to decrease the opacity of milk.

"The same cannot be said of the density. Skimming increases it, adding water decreases it; and the common test, which consists in the mere introducton of the lactodensimeter into milk, is worthless, as a skimmed milk may have a normal density if care has been taken to pour into it a certain amount of water. Density should be taken before and after skimming, and the percentage of cream should be determined with the creamometer. Thus applied, the density test requires a lactodensimeter, a thermometer, and a creamometer, and the test requires twenty-four hours; while the result is not much more accurate than the opacity test just described, which only takes five minutes."

Here we have a simple means by which the housewife can ascertain for herself whether she is paying for pure milk, skimmed milk, or milk and water.

DAIRY FARMING IN DENMARK.

On the dairy farm of Denmark the cows are tethered in lines on the aftermath of first year's seeds and the whole of the second and third years' grass, but they are rarely put on permanent pasture, and then only on the aftermath. When tethered out thus, they generally wear a coat of some coarse material, which covers them from behind the shoulders to the hips, and hangs more than half-way down the flanks. Two hundred cows or more may be seen tethered in long lines across the fields. Water is carted out to them twice a day, and they are milked twice a day in the fields where they stand. In the winter they are kept entirely in the cow-house, and fed on chopped hay and straw, corn in the form of meal, bran, and cake. Linseed cake is not held in much repute by the Danish farmers, and those who use it at all use it very sparingly, as the tendency is to produce an oily consistency in the butter, which greatly prejudices its value in the market.

STERILISING MILK.

A new process of sterilising milk has lately been patented by a Danish inventor, Dr. Budde. This process depends on the existence in the milk of an enzyme "catalase," which decomposes hydrogen peroxide, with the liberation of oxygen. The milk is heated to 120 degrees Fahr., and a small quantity of hydrogen peroxide added. As a result of the reaction which takes place, the pathogenic organisms are destroyed after a short time. The milk is then run into sterilised bottles, fitted with air-tight stoppers.

The Horse.

WORKING MARES.

CONCERNING THOSE WHICH HAVE A FOAL AT FOOT.

Undoubtedly the ideal method to follow in regard to the management of mares with young foals at foot is to keep them turned away at grass during the whole of the time that they are suckling the latter. The natural mode of life which they lead when thus turned out suits them best in the circumstances and enables them to perform their maternal duties in the most satisfactory manner. There is nothing like a grazing diet for promoting a plentiful flow of milk in them, and the more sustenance they produce for their offspring the better, needless to say, will the latter thrive and grow. Under these conditions the foal certainly enjoys every advantage that can conduce to its welfare and development. But, admirable though this plan is, it is not, of course, always feasible to adopt it. The farmer who breeds horses does not usually find it practicable to allow his brood mares to eat the bread of idleness in this fashion throughout the summer season while they are rearing their foals, inasmuch as they mostly form part of the regular horse strength on the farm, so that they cannot, as a rule, be conveniently spared from work for months on end. Sooner or later it becomes necessary to put them to work again, and the interests of the young foal have in this case to be subordinated in some measure to the exigencies of the situation.

Nor does it in any way prove hurtful to mares to work them when they are suckling a foal. They can, in fact, be put to work comparatively soon after they have foaled down. In some parts it is a common practice to commence working farm mares again two or three weeks after foaling. But that can scarcely be regarded as being a desirable arrangement, for, although it may not actually prove detrimental to the mare, if she is treated with the requisite consideration, it does her no good to draw on her services at so early a stage, whilst still less does it conduce to the foal's well-being. At that tender age the temporary separations from its dam and the prolonged periods of abstinence from nourishment which these involve tell on it rather severely, and the young foal is apt to fret immoderately whilst the mare is away, which greatly interferes with its proper progress and prevents it from thriving.

Mares ought always to be allowed a fair rest after foaling, in order that they may fully recuperate after the exhausting effects of parturition, and a month is about the minimum period of rest which it is desirable they should enjoy, whilst a rest of considerably longer duration is to be preferred. In fact, the longer they are allowed to remain idle the better. Very usually farm mares which are suckling a foal are taken into work again at the commencement of the hay-making season, and when a mare has foaled down in April she will by that time have had a nice rest and be quite equal to doing a moderate share of work, while her foal will also be forward enough to undergo temporary separation from her without suffering any detriment. In some cases their services are dispensed with until harvest-time comes round, which gives them from three to four months' rest, and if they can be left to run undisturbed at pasturage for that length of time so much the better for them, and even more so for their foals. Nothing could be more advantageous than that.

In working mares which are nursing a foal it is most essential that they should receive very considerate treatment, and especially so when they are

put to work comparatively soon after they have foaled down. On no account must they be worked too severely, as hard work involves undesirable results. Apart from the fact that it scarcely agrees with the mare, seeing that she is not in a particularly fit condition, as the suckling of her foal saps her strength, it is sure to check the flow of milk very materially, which, of course, has a disastrous effect upon the foal. No adverse effects as regards the secretion of milk need be apprehended so long as the mare is worked in strict moderation only and is not called upon to exert her powers in an undue manner; but severe exertion quickly brings about a diminished flow, especially during the first two or three months after she has foaled, as in this early stage the milk-producing function is most active, and therefore most susceptible to any unfavourable influence.

The interests of the foal, of course, require to be carefully studied when its dam is worked. In addition to the necessity of refraining from over-exerting the latter in any way, so as to avoid all risk of impairing the milk flow, there are various other points which call for careful attention in this direction. Thus it is most important that the mare should not be kept away from the foal for too long a time; otherwise the latter gets excessively hungry, and is then apt to overdrink itself on the return of its dam, especially as a good deal of milk will have accumulated in her udder, and that may easily lead to digestive troubles. A foal's digestion, it may be mentioned, is of a delicate nature, and easily becomes upset. Furthermore, when a foal is kept separated from its dam for an undue length of time it frets itself a great deal, which seriously militates against a thriving condition. Until they begin to feel the pangs of hunger, foals bear the separation from their dam fairly well, if they are not too young, but immediately they get hungry they commence to pine for her. The younger the foal is the more frequently does it require to suck, and in the case of very young foals, therefore, their dams should not be kept away from them for more than three hours at a stretch. As the foals get older the periods of separation can be considerably extended—up to five or six hours.

An important precaution which should be observed is not to allow a foal to suck when its dam is in a heated state from working, as her milk is then apt to disagree with it and to cause scouring. If the mare comes in hot, therefore, she must be left to cool down a bit before rejoining her foal. But when due moderation is observed in working her, as it is desirable should be done, there is little chance of her getting very warm, excepting, perhaps, in hot weather. One sometimes hears the advice given that when a mare returns from work a little of her milk should be drawn off by hand before she is let to her foal, the idea of this being that hereby the danger is avoided of the latter drinking too much milk owing to an excessive quantity having accumulated in the dam's udder. Such advice, however, is very old-fashioned and entirely wrong. There is no need for resorting to this measure, as nothing is gained by it, whilst it means a sheer and unpardonable waste of valuable nourishment, and deprives the foal of some of its substance. The milk produced by a mare is too valuable to be wasted in this manner.

When the mare is taken out to work, the foal must be carefully shut up in a secure place, from which it cannot break out and where there is no danger of its coming to any hurt. On being separated from its dam the youngster will naturally rampage about and try to break out, and it often happens that a foal injures itself in these circumstances when sufficient care has not been exercised to see that it is securely confined. By far the best plan is to put two or more foals together, whilst they are temporarily separated from their mothers, as they then settle much better than if left in solitude. Companionship has a great effect in keeping them contented.—"Live Stock Journal."

NOTES ON MULE-BREEDING.

By J. D. BORTHWICK, M.R.C.V.S., Chief Veterinary Surgeon.

(From the "Agricultural Journal of the Cape of Good Hope," for March, 1908.)

Years ago the Cape mule made a reputation in India as being the mule most suitable for military purposes, and during the late military operations in this country, when he competed with mules from all parts of the world, showed greatly to advantage over all-comers for endurance and keeping his condition under trying circumstances.

As regards the market for mules, it has to be remembered that ox transport in this country is being gradually pushed off the road, and the mule is taking its place owing to the measures required to be taken to prevent the spread of cattle diseases; therefore, the home market is not likely to be glutted for some time to come. The Indian market, too, would, if we produced a uniform type of mule, be open to us, so that the breeder need not be afraid of there being no market.

Class of Mule.

There are three classes of mules which may be divided as follows:—

First.—The heavy draught mule, for draught work at docks, railways, and mines.

Second.—The harness mule for coaching, cape cart, and other fast work.

Third.—The general utility mule for ploughing, transport, farmer's cart, and military or pack mule.

The breeder, having decided which class of mule he can rear with greatest advantage and profit, must then select his stud accordingly.

The remark frequently made that a mare which is not good enough to breed horses from would be all right to breed mules is very misleading, and only made in ignorance: a breeder of horses can by selection of sires go on improving his stock in shape and quality, but it is not so with the mule-breeder, who, having mated the jack and mare, must for ever remain satisfied with the resulting mule.

Donkeys.

There are three principal breeds of donkeys used for mule-breeding—the Catalonian, Poitou, and Andalusian; and of those three the Catalonian stands out pre-eminent as a mule sire. Mr. Killgou, an American authority on mule breeding, states: "I risk nothing when I state that no jack in America has acquired celebrity as a mule-breeder unless more or less partaking of Catalonian blood."

Catalonian Jackass.—The points which are looked for in a purebred Catalonian jack, are:—

(*a*) Colour black, with whitish muzzle and belly, thin skin, and fine hair.

(*b*) Great courage, holding head high, straight action, and exceedingly active. A jack unless possessing courage is useless as a mule sire.
In selecting a jack, Spanish mule-breeders always watch carefully the manner in which the jack comes out of the stable; he should come out with head held high and a defiant look.

(*c*) Long ears.

(*d*) 14 hands to 14 hands 3 inches.

(*e*) Bone below knee $7\frac{1}{2}$ in. to $8\frac{3}{4}$ in., hard, clean, and flat.

(*f*) Neck not too long and must be thick.

Poitou Jack.—The Poitou jack, bred in France, is black in colour, with long hair, standing 14·2 to 15·2 on short thick legs, slow action, and with altogether a heavy sleepy appearance.

Andalusian Jack.—The Andalusian is about the same type to look at as the Catalonian, but are all off colour, mostly grey, wanting in courage and action.

Mares.

The kind to breed from.

As a mule partakes very largely in its size and shape from its dam, great care must be exercised in selecting the mares; they must be sound, well shaped, with a roomy middle, and of a good colour—black, bay, or brown preferably. The colour is a matter of no small importance, as it is desirable to breed mules all of the same colour, which will considerably enhance their value when selling a team.

If the heavy draught mule is intended to be bred, then large heavy mares, standing about 15 hands 2 in., of the Clydesdale, Percheron, and Shire breeds are selected and mated with a Catalonian jack standing about 14·3, thickly set, and on short legs.

The coaching mule is bred from mares standing 15 hands, possessing Cleveland, hackney, and sometimes thoroughbred blood; the jack used being 14 hands to 14 hands 3 in., not too heavy in the body, but must be active and courageous. If a heavy-bodied jack is used with mares such as Clevelands, then the mule is too leggy and the body too heavy, giving the mule a top-heavy appearance. Such a mule soon uses his legs and feet up.

The general utility mule, and the one which I consider this colony is able to produce most of, is got by mating good, sound, well-bred, roomy mares, about 14·2 to 15 hands high, on short legs and having good feet, the jack being a purebred Catalonian of about 14 hands 2 in., thick set, and active.

In selecting mares for whatever class of mule-breeding, care should be taken to select them as much alike as possible, so as to produce mules uniform in colour, shape, and style, a well-matched team being of much more marketable value than a mixed lot.

Care and Use of the Jack.

A jack is capable of serving 40 to 50 mares during the season; and, if well looked after, properly fed, and exercised, he will still be of use when he is twenty years old. I have seen jacks in the province of Catalonia over twenty years of age being used to serve mares, although they had to be assisted on to the mare. As there is no necessity for a mule-breeder to change his sire, as there is in the case of the horse-breeder, it will readily be seen the advantage of giving the jack proper care and attention to recompense for the original outlay of £125 to £175, which, under the condition of length of service, is cheaper than the horse-breeder's £500 thoroughbred.

The jack should be provided with a clean, well-ventilated, loose box and a well-secured paddock for exercise, in which he can be turned loose in the day time. Never allow him to run with donkeys. Keep him always in good condition. On no account allow him to get thin, and see that his feet get proper attention, so many being inclined to become club-footed.

The service of the mare should always take place at the same place. The usual custom in Spain is to place the mare in a stall formed of a cross-bar in front about the height of her chest, and two side poles exetnding back to her quarters with a slope to about 2 ft. from the ground; side lines are then put on, and the mare is ready for service. The jack is then brought to the mare, but not allowed to mount till he is ready. It must be remembered that a jack takes longer to get ready, and patience must be exercised; many good jacks are spoilt through the want of a little care. Jacks have been

known to refuse serving for a whole season through having been kicked. Some jacks, especially old ones, have a habit of biting the mares severely, and in those cases a net muzzle should be worn. If the mares are unbroken, then a pony stallion should be used to try which mares are in season, and these driven into a small kraal; but it is most desirable to handle the mares sufficiently at all events to make them halter-broke.

Having selected and mated the sire and dam, the breeder then looks forward to the appearance of the mule, whose shape, style, and quality will reveal the breeder's judgment. At this stage it must be seen that the dam gets sufficient food to provide a good supply of milk for her mule, which must be highly nourished to be able to grow out; in fact, care must be taken, until such time as the mule is disposed of, that he is kept in good condition. It is next to impossible to sell a thin mule, whilst fat ones command their full value, which will compensate for their feeding. The mules should be weaned when about 7 months old, and placed in a camp with a quiet old mare, preferably a grey one, as companion. The mules soon become attached to the mare, which helps to keep them quiet. The mules should be periodically kraaled to prevent them becoming wild, so that when they require to be broken it becomes an easy matter if done with patience and kindness. It must always be remembered that a mule is not a natural animal, but is rather the invention of man, and has been aptly described as an "animal with no ancestry and no hope of posterity."

Whilst he is a "natural puller," he has enormous strength, which he is loth to make use of, but if given a lead he exerts himself to his very utmost. The Spaniards, recognising this, nearly always have a horse or, better still, a grey mare to lead their teams.

OLIVE OIL SCARCITY.

For every crop there comes a time at shorter or longer intervals when supplies are short in some part of the world and plentiful in another, with the result that prices go up, and those fortunate enough to hold stocks realise large profits. At the present time, the cotton crop in Texas and Georgia, U.S.A., will, it is predicted, by a well-known cotton-broker, fall lamentably short, and the shortage generally will amount to about 1,000,000 bales. There is no reason why a considerable portion of this shortage should not be supplied by Queensland growers. Again, the shortage in the olive crop in Italy and Tunis is so great that prices for olive oil range from 25 to 33⅓ per cent. more than they did at this time last year. The scarcity is due to two causes—first, the damage of the olive fly, which causes the fruit to fall prematurely from the trees; and, secondly, the shortage brought about by the drought of the past summer months. It is said by the experts in Italy that the inhabitants there will have to import olive oil substitutes. The "Cyprus Journal," from which we take the above, also states that the olive oil crop in the regency of Tunis has been a failure in 1908, and that no oil will be available for export. The olive tree thrives to perfection in Queensland, and excellent oil in small quantities has been frequently placed on the market in Brisbane, realising from 10s. to 12s. per gallon. On a large estate, the average yield of oil is about 2 gallons per tree, but individual trees will yield as much as from 12 to 20 gallons, while one renowned tree is stated to have yielded 55 gallons, and another 3 cwt. of oil. Taking the average to be as low as 1 gallon per tree, and sixty trees to the acre, the produce at 10s. per gallon would be £30 per acre in the early years of bearing, exclusive of the value of the oil cake. The tree fruits well on the coast lands of Queensland, and also on the Darling Downs. This is another payable industry neglected in Queensland.

Poultry.

FATTENING CHICKENS.

Young cockerels that have free range on the farm possess a good frame and constitution, but they lack in flesh and in quality of meat. When fed in pens or crates for two or three weeks, they gain in flesh very rapidly, while the increase in the bones or frame is relatively very small. Professor Robertson demonstrated by experiment that one fatted chicken had as much edible material on its frame as three like chickens not fatted. Young cockerels of the general purpose breeds, 2 to 4 lb. in weight, are very economical producers of meat when confined in pens and fed properly. In Professor Robertson's experiments (we are again quoting from Professor James Dryden's lecture referred to in last month's journal), 131 chickens, weighing 492 lb., gained in four weeks 335 lb. The cost per lb. of gain was 4·9 cents ($2\frac{9}{20}$d.). This represents not only a gain in weight, but a gain in quality, and the market will pay much more for such chickens than for those direct from the range. From lack of exercise, the muscles become much more edible or tender. A considerable business in fattening or, more properly, fleshening chickens has grown up in several Western States. This business is largely done by the packing companies, who buy the chickens from the farmers and fatten them at fattening stations. This work might be done on the farm, and the profit saved to the farmer. There is probably no class of live stock that will produce meat at less food cost than will young cockerels of the right age, and no other kinds of farm animals sell at as high a price per lb. as chickens.

RATIONS.

Which grain to use in fattening will be governed partly by its price. For best results, the grain is ground and fed moist. It is usually fed with skim milk or butter milk. Professor Graham, of the Ontario Agricultural College, says that the best ration used at that station is one made of 2 parts finely-ground oats, 2 of finely-ground buckwheat, and 1 of corn meal, mixed with sour milk, using one and a half times as much milk as grain, and sometimes twice as much. Where the markets demand a yellow-flesh fowl, as most of them do in this country (U.S.A.), a larger proportion of corn will be desirable in the ration; but corn alone will prove unsatisfactory. Ground oats alone, with the coarser hulls removed, will give good results where white flesh is not discriminated against. Barley may also form part of the ration. The chickens should be fed lightly the first week; after that, all they will eat up clean, three times a day. It is important that they be kept quiet, and the sexes should be separated. After three weeks of feeding, the chickens begin to lose their appetites, when they should be marketed.

PEN AND CRATE FATTENING.

The relative merits of pen and crate feeding have not been clearly demonstrated. In experiments conducted at the Canadian experimental farms, the results were in favour of the pen method; while at the Ontario station the results were in favour of crate feeding. It is certain, however, that profitable results are secured from pen fattening; and it is doubtful whether it will pay the farmer to adopt the crate method with its additional labour and expense. The use of the cramming machine is practicable only where large numbers of chickens are fed, and where expert operators are available.

CAPONISING.

Caponising is chiefly valuable in supplying the demand for high-class roasting chickens in late winter or early spring, when uncastrated males are unsaleable except at low prices. The capon retains its good eating qualities till ten or twelve months of age, when prices are good for such stock. Capons are very quiet and docile, and put on flesh economically. It requires some skill to perform the operation of caponising, but instructions accompany each set of instruments purchased. Unless the farmer possesses the necessary skill or can engage someone who has, it will pay him better to fatten the cockerels and sell them in the late summer or fall.

MARKETING THE PRODUCT.

To get the most from poultry on the farm, some attention must be given to method of marketing the product. It will pay the farmer to cultivate a market in the city, if he is within reasonable distance of it, so that he can make regular shipments. Where one farmer has not the necessary quantity to make shipments, a little co-operation with his neighbours would be of mutual advantage. To secure and hold a select trade, it will be necessary to give attention to several points usually neglected on the farm.

MARKETING EGGS.

Eggs vary in size, colour, flavour, and keeping quality just as fruits vary; and it is of as much importance that the poultry-man grade his eggs as it is for the fruit-grower to grade his fruit. The nests in which the eggs are laid should be clean; otherwise the eggs will lack in keeping quality. The germs of decomposition enter the egg through the shell, and for this reason eggs laid in dirty nests will deteriorate in quality more rapidly than eggs laid in clean nests. The eggs should be gathered regularly each day, and broody hens should not be allowed to sit on them any length of time. They should be of uniform size and colour. Where white eggs are demanded, select only white eggs, or keep a breed of fowls that lay white eggs. Those off in size and colour should be discarded and sold in the local market. In every city there are reliable grocery stores that are willing to pay a premium for regular shipments of select eggs. It is possible by shipping eggs direct to the consumer to get higher prices. For this purpose, special crates will be necessary. These may be similar in construction to the commercial egg crate, but smaller, the size depending somewhat on the requirements of the individual customer. For shipping both eggs and poultry a combination crate may be used, putting eggs in one end and dressed poultry in the other.

MARKETING CHICKENS.

In selling chickens, uniformity of product as well as quality should be considered. A crate of chickens of one breed and of the same size will find more ready buyers than a promiscuous lot of different sizes and different colour. Whether the farmer ships his chickens alive or dressed will depend on market prices and requirements. In catering to a select retail trade, it will usually be necessary to dress them, but the killing and dressing must be carefully done; otherwise it will pay better to ship them alive.

KILLING AND DRESSING.

Before killing, the chickens should be starved for about twenty-four hours. Food remaining in the crop and intestines will injure the keeping qualities of the chicken and affect its sale. The most approved method of dressing chickens is to pluck them dry. They should be killed by sticking with a knife in the roof of the mouth. The bird is suspended by the legs, and picking begins

as soon as the "stick" has been made. It requires some skill to stick the bird well. If picking is left till the bird begins to get cold, the feathers will be removed with difficulty. The chickens are usually undrawn, and the head and legs are left on. After dressing, the animal heat should be removed as quickly as possible, when they should be packed. It is well, however, to study carefully the demands of the market as to dressing, as the requirements vary in different markets. It should be remembered always that cleanliness and neatness have a market value when applied to dressing chickens and packing them for shipment.

THE TROUBLES OF DUCKLINGS.

COMMON CAUSES OF LOSS.

The average duckling does not have a sufficiently long life to suffer from much disease, but at the same time there are a good many losses which are vexatious and irritating to the poultry farmers, even amongst young ducklings; and I propose to indicate briefly some of the commonest causes of loss. At the outset I should like to point out the undesirability of overcrowding ducklings. This is a very common failing, it being supposed that a very large flock can safely be kept together without much risk. As a matter of fact, although they are supposed to be passed on to market at the age of 10 or 12 weeks, a good deal of loss does occur which might be obviated if they were spread out more, and if the more delicate ones amongst them consequently received a fairer share of treatment. I do not believe in the principle of the survival of the fittest in duckling-rearing, because that means loss of a large number which might otherwise be saved, and, considering the fact that it takes a month to get a duckling hatched out, it is surely not worth while to lose a large number, and so waste time.

Diarrhœa is one of the commonest causes of loss amongst ducklings, and in nine cases out of ten this is due to giving them sour, unwholesome food. It is a great mistake to mix more food than the ducklings will eat readily at any time of feeding. Any food that may be left beyond that should be destroyed, and should on no account be kept until the next time of feeding (I am speaking now of soft food mixed up, as meal generally is, wth hot water or milk). Ducks are supposed to be very dirty creatures, and to be capable of living on all sorts of objectionable things. That, however, is not quite the same thing as having sour fermenting food given to them. The duck in its natural state eats worms and things of that sort which it obtains in a perfectly wholesome state. Artificially prepared food, however, if in a state of fermentation, is not by any means so wholesome as many of the objectionable things, as they appear to us, that ducks would get in their wild state. Be careful, therefore, about the feeding.

CRAMP.

This is exceedingly common, and may be due to one of two causes. Either the ducklings are being kept under conditions which tend to give them rheumatic trouble, or else the food they get is not sufficiently rich in the constituents that make for the growth of frame.

A good many ducklings that are supposed to have cramp are really suffering from anæmia or want of nourishing food. Ducklings cannot be reared satisfactorily on Indian meal, for example, and yet this is very largely used. The best food for ducklings is a mixture of oatmeal and milk (skimmed milk, that is). This mixture contains all that is necessary for the rapid development of the frame, and particularly so if a small quantity of lean meat should be added to it. Ducklings should never be allowed to sleep on a brick floor. Many people put them into pigsties and places of that kind where there are brick floors; that is a great mistake, and liable to give them cramp. They

want a very warm bedding to squat down upon at night, and the best bedding I know of is made by putting down a layer of peat moss dust and chaff combined, or peat moss dust with a little hay spread over the top of it. This is very warm and very sanitary. The dirty, damp, muddy sleeping places that one often sees allotted to ducklings are hopelessly mischievous.

LUNG DISEASE.

This is due, as a rule, to overcrowding. Ducklings can be started very well in a foster mother, but it does not do to keep them too long there, and they should be kept very warm at night, because they are very sensitive to lung disease. By the way, I have known many ducklings to die of simple cold-starvation, which prevents the proper circulation of their blood, and their lungs and heart simply stop working. Disease of the lungs is often hereditary, and comes to them from the parent birds. It is true, however, that, as a rule, ducklings do not develop it until they have got past the first moult, and by that time they ought to be fattened off and sent to market. Lung trouble is only another name for tuberculosis, and the symptoms of it are general wasting, the bird being reduced to a mere bag of skin and bones. If there should be any losses amongst ducklings that seem attributable to this cause, the best remedy is to give them cod liver oil in their food. As a matter of fact, the veterinary chemists who supply farmers with condiments and articles of that kind for cattle purposes generally sell what is known as cod liver oil condiment, and a little of this I believe to be very good for ducklings.

One other complaint, and then I must close the list. Ducklings do not suffer as a rule from roup, but they very often suffer from cold in the eyes, which would develop into roup later on. This cold may be due to various causes, but the commonest is, of course, a draughty sleeping-house. Ducklings, of course, have got to be kept on the floor, and great care should be taken that the place in which they sleep is properly ventilated. The best way to ventilate a building of that kind is to have holes at both ends of the apex of the roof, so that there is a clear current of air going through which carries off the vitiated air from their lungs. If the duckling-house, or the brooder, or whatever they are in, is not properly ventilated, they will be liable to develop lung trouble, and also to develop eye trouble in the form of what is called "one-eye cold," to which ducklings, in common with chickens and turkeys, are very subject. This is more or less contagious, and one duckling with cold in the eyes will often give it to a number of others. Any such bird should be taken in hand, and should be treated by having the eye bathed with tepid water, and then anointing with a little vaseline or some other simple ointment, and should be kept in hand until it has completely recovered before it is put back with the others.

These, then, are some of the complaints to which ducklings are liable, and attention to them will save losses which, though they may not be serious individually owing to the comparatively small value of the individual birds, still count for a good deal where time is taken into consideration, and where space is valuable and opportunity has to be made the most of.—"Agricultural Gazette," London.

TO POLISH HORNS.

First scrape the horns with glass to take off any roughness. Then procure some finely-powdered pumice stone, dip a damp cloth into it, and with this rub the horns till a smooth face is obtained. Afterwards polish with linseed oil and rotten stone, and the more the horn is rubbed with this the better will be the polish. Finish by rubbing with dry flour and a clean piece of rag.

The Orchard.

BANANA CULTIVATION.

Notwithstanding the belief still held by some—that the banana, the plantain, the fibre-producing banana of the Phillipine Islands, and the wild banana, so plentiful in the scrubs of North Queensland, belong to different families—botanists are very clear on the point that all are members of one family. So closely are the banana and plantain related that it is impossible to say where the banana ceases and the plantain begins. All varieties known to-day sprang originally from the native wild plants of the Asiatic islands known as *Musa sapientum*. The fruit of the wild banana contains scarcely any edible flesh. Its leathery skin encloses a large number of black seeds, adhering to a mid rib, and covered with a gummy substance something like bird lime. In no cultivated variety can any seed be detected, although we occasionally notice small black sptos in the flesh in regular rows. These are probably the faint traces of seed which have not been entirely eliminated by cultivation. Semler says that all cultivated bananas have been derived from *Musa troglodytarum*, which is a native of the Moluccas. This plant, unlike other wild bananas, bears edible fruits in bunches which stand upright, not hanging down like the cultivated fruit.

It is supposed by some that the wild banana of North Queensland could be, by cultivation, brought to bear edible fruits. No doubt they could, but the experimenter would have to live to over 100 years to enjoy the fruits of his labour. His time will be better occupied in reproducing the cultivated plant. As the latter have no seeds, this is done by suckers from the roots.

The rank luxuriance of the growth of this class of fruits, their handsome foliage (writes Mr. A. H. Benson, in his "Fruits of Queensland"), their productiveness, their high economic value as food, and their universal distribution throughout the tropics, all combine to place them in a premier position.

As a food, it is unequalled amongst fruits, as, no matter whether it is used green as a vegetable, ripe as a fruit, dried and ground into flour, or preserved in any other way, it is one of the most wholesome and nutritious of foods for human consumption. It is a staple article of diet in all tropical countries, and the stems of several varieties make an excellent food for all kinds of stock.

In Queensland the culture of bananas is almost confined to the frostless belts of the eastern seaboard, as it is a plant that is extremely sensitive to cold, and is injured by the slightest frost. At the same time, bananas, particularly the low-growing kinds, thrive in the Southern parts of the State where frosts are of frequent occurrence. Good crops of fruit have been grown year after year on the Brisbane River and on Oxley Creek, where potatoes, pumpkins, and sweet potatoes have been killed by frost. As a rule, the taller the variety, the warmer and moister must be the climate. The banana also thrives best in the neighbourhood of the sea, the plant containing a certain amount of salt, which may be looked upon as necessary for its well-being.

In the Southern part of the State its cultivation is entirely in the hands of white growers, who have been growing it on suitable soil in suitable localities for the past fifty years. Mr. Benson says he saw a plantation that was set out twenty years ago, and the present plants are still healthy and bearing good bunches of well-filled fruit, so that there is no question as to the suitability of soil or climate. Bananas do best on rich scrub soil, and it is no detriment to their growth if it is more or less covered with stones (as may be

verified by a visit to the banana groves at Brookfield, near Brisbane), so long as there is sufficient soil to set the young plants. Shelter from heavy or cold winds is an advantage, and the plants thrive better under these conditions than when planted in more exposed positions. Bananas are frequently the first crop planted in newly burnt-off scrub land, as they do not require any special preparation of such land; and the large amount of ash and partially burnt and decomposed vegetable mould provide an ample supply of food for the plant's use. Bananas are rank feeders, so that this abundance of available plant food causes a rapid growth, and produces fine plants and correspondingly large bunches of fruit weighing as much as from 60 lb. to 80 lb. Though newly burnt-off scrub land is the best for this fruit, it can be grown successfully in land that has been under cultivation for many years, provided that the land is rich enough naturally, or its fertility is maintained by judicious green and other manuring. In newly burnt-off scrub land all that is necessary is to dig holes 15 to 18 in. in diameter, and about 2 ft. deep, set the young plants in it, and partly fill in the hole with good top soil. The young plant, which consists of a sucker taken from an older plant, will soon take root and grow rapidly under favourable conditions, producing its first bunch in from ten to twelve months after planting. At the same time that it is producing its first bunch it will send up two or more suckers at the base of the parent plant, and these in turn will bear fruit, and so on. After bearing, the stalk that has produced the bunch of fruit is cut down; if this is not done, it will die down, as its work has been completed, and other suckers take its place. Too many suckers should not be allowed to grow, or the plants will become too crowded, and be consequently stunted and produce small bunches. All the cultivation that is necessary is the keeping down of weed growth, and this, once the plants occupy the whole of the land, is not a hard matter. A plantation is at its best when about three years old, but remains profitable for six years or longer; in fact, there are many plantations still bearing good fruit that have been planted from twelve to twenty years. Small-growing or dwarf kinds, such as the Cavendish variety, are planted at from 12 to 15 ft. apart each way, but large-growing bananas, such as the Sugar and Lady's Finger, require from 20 to 25 ft. apart each way, as do the stronger-growing varieties of plantain. Plantains are not grown to any extent in Queensland, and our principal varieties are those already mentioned, the Cavendish variety greatly predominating. In the North, the cultivation of this latter variety is carried out on an extensive scale, principally by Chinese gardeners, who send the bulk of their produce to the Southern States of the Commonwealth. The industry supports a large number of persons other than the actual producers of the fruit, and forms one of our principal articles of export from the North. As many as 20,000 or more large bunches of bananas frequently leave by a single steamer for the South, and the bringing of this quantity to the port of shipment gives employment to a number of men on tram lines and small coastal steamers. The shipment of a heavy cargo of bananas presents a very busy scene that is not soon forgotten, the thousands of bunches of fruit that are either piled up on the wharf or that are being unloaded from railway trucks, small steamers or sometimes Chinese junks, forming such a mass of fruit that one often wonders how it is possible to consume it all before it becomes over-ripe. Still, it is consumed, or, at any rate, the greater portion of it is, as it is the universal fruit of the less wealthy portion of the community, the price at which it can be sold being so low that it is within the reach of everyone. A banana garden in full bearing is a very pretty sight, the thousands of plants, each with their one or more bunches of fruit, as where there are several stems it is not at all uncommon to find two or more bunches of fruit in different states of development on the same plant, forming a mass of vegetation that must be seen to be appreciated. This is the case even with dwarf-growing kinds, but with strong-growing varieties, such as the Lady's Finger, the growth is so excessive that the wonder is how the soil can support it.

Bananas do remarkably well in Queensland, and there is practically an unlimited area of country suitable for their culture, much of which is at present in a state of Nature. Only the more easily accessible lands have been worked, and of these only the richest. Manuring is unknown in most parts, and as soon as the plantation shows signs of deterioration it is abandoned, and a fresh one planted out in new land, the land previously under crop with bananas being either planted in sugar-cane or allowed to run to grass. This is certainly a very wasteful method of utilising our land, and the time will come, sooner or later, when greater care will have to be given to it, and that once land has become impoverished by banana culture it will have to be put under a suitable rotation of crops, so as to fit it for being again planted with bananas. The trouble is, as I have already stated, we have too much land and too few people to work it; hence, so far, we are unable to use it to anything like the best advantage. During the year 1904 the production of bananas in Queensland was some 2,000,000 bunches; and when it is considered that each bunch will average about 12 dozen fruit, it will be seen that already we are producing a very large quantity. There is, however, plenty of room for extension, and any quantity of available country, but, before this extension can be profitable, steps will have to be taken to utilise the fruit in a manner other than its consumption as fresh fruit, and this in itself will mean the opening up of new industries and the employment of a considerable amount of labour. I have mentioned 12 dozen as being the average quantity of fruit per bunch, but it is frequently much more than this, and I have often seen bunches of 25 to 30 dozen fine fruit grown on strong young plants on rich new land. Although the industry in the North is now almost entirely in the hands of Chinese gardeners, there is no reason whatever why it should not be run by white growers, as is done in the South, and there is no question that our white-grown bananas in the South compare more than favourably with the Northern Chinese-grown article, despite the fact that the latter has every advantage in climate and an abundance of virgin soil. The two photos. of bananas are not by any means typical of this industry, as they have been taken during the off season, when the plants look ragged and are showing little new growth, and the bunches also are much smaller than usual. Still, the illustrations will give some idea of the growing and handling of this crop, and will show what a banana plant and its bunch are like.

HOW TO CONTROL THE SAN JOSE SCALE.

The United States Department of Agriculture has issued the following Bulletin by C. L. Marlatt, Entomologist, of the Bureau of Entomology, which should prove of interest to Queensland orchardists, on "How to Control the San Jose Scale."

The San Jose Scale a Permanent Factor in Fruitgrowing.

The San Jose Scale is so widely disseminated and has become so firmly established in the principal deciduous-fruit regions of this country that its extermination is now, in most cases, out of the question. In the main, therefore, the San Jose Scale must be recognised as a permanent factor to be regularly dealt with as are other insect evils or the fungus diseases of plants.

Extermination is possible only where the scale is detected at the very outset on new or recently planted nursery stock or at least before any considerable chance of spread has been afforded. It is true that by the greatest care in the introduction of nursery stock the San Jose Scale may, for years, perhaps, be kept out of districts now free from it, and one is warranted, therefore, in adopting every precaution to avoid introducing this scale and even

to attempt extermination wherever the conditions are reasonably favourable. There is only one method of exterminating the scale, and that is by digging up and burning all infested trees. This is an heroic remedy, and is advised only under the conditions of very recent introduction of nursery stock—in other words, where the scale is discovered within a few months after the purchase of the infested trees. If the scale has passed an entire breeding season in an orchard it will have spread much more widely than any inspection will indicate, and very likely will have gained a footing on wild and ornamental plants other than fruit trees, from which it will reintroduce itself into neighbouring orchards or into new plantings, however thorough may have been the attempts to eradicate it.

While, therefore, one is undoubtedly justified in asserting that the San Jose Scale is to be a permanency, it by no means follows that the profitable growth of deciduous fruits is seriously menaced on this account. The experience in California, covering many years, and in the East now for a considerable period, has abundantly demonstrated that this scale insect can be controlled. In other words, by proper treatment, the value of which has been demonstrated by much practical experience, an orchard may be protected from serious injury and kept in a good paying condition so far as influenced by the San Jose Scale.

THE DIFFERENT MEANS OF CONTROLLING THE SAN JOSE SCALE.

The methods of control which have been especially followed in the Eastern States are (1) the application of the lime-sulphur wash, (2) the soap treatment, (3) treatment with pure kerosene, (4) treatment with crude petroleum, (5) treatment with mechanical mixtures of either of the last two oils with water, (6) the application of petroleum emulsion with soap, and (7) miscible oils. All of these methods have proved successful against the San Jose Scale when properly carried out. The lime-sulphur wash is, however, the cheapest and safest, and has become the standard remedy against the San Jose Scale in commercial orchard practice. One's choice of insecticide must be governed by availability, special needs, and experience. In the main these remedies are winter treatments, and may be employed at any time when the trees are in dormant, leafless condition. The weaker oil-water mixtures and the emulsions may, however, be used in the growing season. The treatments enumerated are all for trees in the orchard. Nursery stock badly enough infested to require such treatment is best destroyed. For the general disinfection of nursery stock the hydrocyanic-acid-gas treatment is the standard and only satisfactory means.

The Lime-Sulphur Wash.

In California, where the San Jose Scale first appeared, the standard remedy against it is the lime-sulphur-salt wash, a mixture formerly used as a sheep dip in Australia, and employed with little change against the San Jose Scale. This wash was naturally first thought of on the discovery of the San Jose Scale in eastern orchards. The earlier tests, however, conducted by this office in 1894, gave unfavourable results, and the experimentation which followed resulted in the demonstration of several distinct and valuable methods of control noted below. Later studies of the action of this wash in California led the writer in 1900 to give it a further careful trial in the East, with most successful results, demonstrating that, with favouring conditions—*i.e.*, absence of dashing rains for a few days after the application—it would give just as good results in the Eastern States as on the Pacific coast. A year later (1901-2) very elaborate tests conducted by Dr. Forbes in Illinois showed that fairly hard rains will not always invalidate spraying with this mixture. A vast amount of experience of the most practical kind since gained, contributed to by all the eastern experiment stations and by the big commercial fruit-growers of

the Middle and Eastern States, has fully demonstrated the practical merit of this wash and its superiority to others in point of safety to trees and in cheapness. Its disadvantages are the difficulty of preparation and the heavy wear which it entails on apparatus—objections, however, which do not offset its notable advantages, particularly for commercial orchard work or where the number of trees to be treated is sufficient to warrant the trouble of its preparation. It is, in fact, the standard spray now used in commercial orchards for the San Jose Scale.

Composition and Preparation.—In the matter of composition of the wash, scarcely any two experimenters agree. Salt was a part of the original composition of the sheep dip, and has long been retained, with the idea that it added, perhaps, to the caustic qualities, and particularly to the adhesiveness of the wash. For the latter purpose a very small amount only, 1 or 2 lb. to the bushel of lime, need be added, following the custom in the preparation of whitewash mixtures. In practical experience, however, the salt seems to have been of very little benefit, and is therefore omitted in the formula now given. The proportion of lime and sulphur is a matter of some indifference. The mixture obtained is sulphide of lime, and if an excess of lime is used it simply remains undissolved in the mixture and adds to the whitewashing character of the application. Too much lime is distinctly objectionable, however, because of the greater difficulty of spraying and harder wear on the pump and nozzles. The formula here given is substantially the one which has been hitherto recommended by this bureau, reduced to the 45 or 50 gall. basis, or the capacity of the ordinary kerosene barrel commonly used in its preparation by the steam method—

Unslaked lime	20 lb.
Flowers of sulphur	15 lb.
Water to make	45 to 50 gall.

The flowers of sulphur, although requiring somewhat longer cooking, seems to make a better wash than ground sulphur, but the latter may be employed. Stone lime of good quality should be secured and slaked in a small quantity of water, say one-third the full dilution. The sulphur, previously mixed up into a stiff paste, should be added at once to the slaking lime. The whole mixture should be boiled for at least one hour, either in an iron kettle over a fire out of doors or in barrels by steam. Prolonged boiling increases the percentage of the higher sulphides, but the practical end is obtained by boiling for the time indicated. In the process of making, the colour changes from yellow to the clear brown of sulphide of lime, except for the excess of lime floating in it. After an hour's boiling the full quantity of cold water may be added, and the mixture should then be promptly applied in order to get its full strength before the higher sulphides are lost by cooling and crystallising out. In transferring to the spray tank it should be passed through an iron screen or strainer, and the tank itself should be provided with an effective agitator.

Directions for Use.—The wash is a winter application, and cannot be applied to trees in leaf. It may be applied at any time after the falling of foliage in early winter and prior to the swelling of the buds in spring. The later the application can be made the better the results, and the best period is just before the buds swell in March or April. It will probably be necessary also to make this application every year, or at least as often as the San Jose Scale develops in any numbers. The wash kills the San Jose Scale not only by direct caustic action, but also by leaving a limy coating on the trees, which remains in evidence until midsummer or later, and kills or prevents the settling of young scale insects which may come from parents escaping the winter action.

The wear on pumps and nozzles can be kept to a minimum by carefully washing the apparatus promptly after use. The Vermorel nozzle is the best one for the wash, and additional caps may be secured to replace worn ones. The use of an air or other gas pressure pump instead of the ordinary liquid pump will save the wear of the lime on the pump. In spraying with this wash clothing is ruined, and only the oldest garments should be worn. Care should be taken also to protect the eyes to avoid unnecessary inflammation.

Range of Usefulness.—This wash is distinctively the remedy for the San Jose Scale, and is particularly effective in applications to the smooth-bark fruit trees—such as peach, pear, and plum. In the case of the apple, the terminal twigs are often covered with a fuzzy growth, more pronounced in some varieties than others, which prevents the wash from properly coating the bark. The young from scale insects which escape destruction at such points, for the reason indicated, or from imperfect spraying, are driven out on to the new growth, or, in the case of fruit spurs, on to the fruit, so that a tree on which the scale has been pretty thoroughly exterminated may nevertheless present badly-spotted fruit.* In such cases the additional use of some one of the oil sprays may be necessary.

This wash is of nearly equal value against closely allied scale pests, such as Forbes's scale and the West Indian peach scale, and late sprayings are quite effective against the scurfy scale and the oyster-shell scale. Other insect pests which winter on the bark or about the buds are destroyed by it.

In addition to this range of usefulness against insect pests, this wash has shown itself to be a valuable fungicide, notably for the peach leaf curl, sprayed trees being practically immune from this disease, so that the cost of treatment in the case of the peach is often more than made good by the fungicidal benefit alone. Later experience indicates its usefulness also as a winter application for apple scab, and possibly for other plant diseases.

The Soap Treatment.

Whale-oil or fish-oil soap, preferably made with potash lye, is dissolved in water by boiling at the rate of 2 lb. of soap to the gallon of water. If applied hot, and on a comparatively warm day in winter, it can be easily put on trees with an ordinary spray pump. On a very cold day, or with a cold solution, the mixture will clog the pump, and difficulty will be experienced in getting it on the trees. Trees should be thoroughly coated with this soap wash. Pear trees and apple trees may be sprayed at any time during the winter. Peach trees and plum trees are best sprayed in the spring, shortly before the buds swell. If sprayed in midwinter or earlier, the soap solution seems to prevent the development of the fruit buds, and a loss of fruit for one year is apt to be experienced, the trees leafing out and growing, however, perhaps more vigorously on this account. The soap treatment is perfectly safe for all kinds of trees, and is very effective against the scale. With large trees or badly-infested trees, preliminary to treatment it is desirable, with this as well as other applications, to prune them back very rigorously. This results in an economy of spray, and makes makes much more thorough and effective work possible. The soap may be secured in large quantities at from 3½ cents to 4 cents per lb., making the mixture cost, as applied to the trees, from 7 cents to 8 cents a gallon. The success of the soap treatment is largely influenced by the character of the soap used. Many brands are on the market, mostly made with soda lye. A potash soap should be insisted on, and one that does not contain more than 30 per cent. of water. The soda soap washes are apt to be gelatinous when cold, and difficult or impossible to spray except when kept at a very high temperature.

* *See* Bul. 46, Bur. Ent., U.S. Dept. Agr., p. 54.

Oil Washes and Emulsions.

The scale washes enumerated under this heading, in which petroleum is the principal ingredient, are often more available for limited work than the lime-sulphur wash. The precautions noted under each should be carefully attended to, or otherwise serious damage may result.

Kerosene Treatment.—The kerosene treatment consists in spraying the trees with ordinary illuminating oil (coal oil or kerosene). The application is made at any time during the winter, preferably in the latter part, and by means of a spray pump making a fine mist spray. The application should be made with the greatest care, merely enough spray being put on the plant to moisten the trunk and branches without causing the oil to flow down the trunk and collect about the base. With the use of this substance it must be constantly borne in mind that careless or excessive application of the oil will be very apt to kill the treated plant. The application should be made on a bright, dry day, so that the oil will evaporate as quickly as possible. On a moist, cloudy day the evaporation is slow, and injury to the plant is more apt to result. If the kerosene treatment be adopted, therefore, it must be with a full appreciation of the fact that the death of the tree may follow. This oil has been used, however, a great many times, and very extensively, without consequent injury of any kind. On the other hand, its careless use has frequently killed valuable trees. Its advantages are its effectiveness, its availability, and its cheapness, kerosene spreading very rapidly, and much less of it being required to wet the tree than of a soap-and-water spray. Pure kerosene is more apt to be injurious to peach and plum than to pear and apple trees, and the treatment of the former, as with the soap wash, should be deferred until spring, just before the buds swell. With young trees especially it is well to mound up about the trunk a few inches of earth to catch the overflow of oil, removing the oil-soaked earth immediately after treatment.

The Crude Petroleum Treatment.—Crude petroleum is used in exactly the same way as is the common illuminating oil referred to above. Its advantage over kerosene is that, as it contains a very large percentage of the heavy oils, it does not penetrate the bark so readily, and, on the other hand, only the light oils evaporate, leaving a coating of the heavy oils on the bark, which remains in evidence for months and prevents any young scale, which may come from the chance individuals that were not reached by the spray, from getting a foothold. Crude petroleum comes in a great many different forms, depending upon the locality, the grade successfully experimented with in the work of this bureau showing 43 degrees Baumé. Crude oil showing a lower Baumé than 43 degrees is unsafe, and more than 45 degrees is unnecessarily high. The lower specific gravity indicated (43 degrees) is substantially that of the refined product, the removal of the lighter oils in refining practically offsetting the removal of the paraffin and vaseline. The same cautions and warnings apply to the crude as to the refined oil.

The Oil-Water Treatment.—Various pump manufacturers have placed on the market spraying machines which mechanically mix kerosene or crude petroleum with water in the act of spraying. The attempt is to regulate the proportion of kerosene so that any desired percentage of oil may be thrown out with the water and be broken up by the nozzle into a sort of emulsion. Some of these machines, when everything is in good working order, give fairly satisfactory results, but absolute reliability is far from assured. The best outlook for good apparatus of this sort seems to be in carrying the oil and water in separate lines of hose to the nozzle, uniting them in the latter, and maintaining an absolute equality of pressure on both the oil and the water tanks by employing compressed air as the motive force, kept up by an air pump, the air chamber communicating with both of the liquid

receptacles. One or more manufacturers are now working on apparatus of this general description. A 10-per-cent.-strength kerosene may be used for a summer spray on trees where the San José Scale is multiplying rapidly, and where it is not desirable to let it go unchecked until the time for the winter treatment. The winter treatment with the water-kerosene sprays may be made at a strength of 20 per cent. of the oil. Applications of the oil-water spray should be attended with the same precautions as with the pure oil, and there is even somewhat greater risk, owing to the nâtural tendency one has to apply the dilute mixture much more freely than the pure oil. The application should be merely enough to wet the bark, and should not, to any extent, at least, run down the trunk. The collection of water and oil about the trunk is just as dangerous to the tree as is the pure oil.

In the use of the oil sprays noted above, one who has had no experience with them is advised to make some careful preliminary tests to fully master the process, preferably waiting two or three weeks to determine the results before entering on a general treatment of the orchard. It is well, also, with the oil-water mixtures to test the pump from time to time, spraying into a glass jar or bottle to determine by actual measurement whether the correct percentages of oil and water are being maintained.

Petroleum-Soap Emulsions.—The kerosene-soap emulsion, following chiefly the Riley-Hubbard formula, has been one of the standard means against scale insects for twenty years. The distillate emulsion generally employed in California for spraying citrus trees, on which the lime-sulphur wash cannot be used, is substantially the same thing, except that it is made with the California distillate or petroleum oil. Crude petroleum of any kind, as well as the refined product, may also be used in making this emulsion. The use of the soap emulsion against the San José Scale in the East has not been very general on account of the greater facility with which the pure oil or oil-water mixtures can be applied. The difficulty of obtaining uniform results with the latter has led to a return to the use of emulsions to some extent, and there can be no doubt about their superior merit when it is desired to dilute the pure oils. Emulsions may be applied at any strength with absolute confidence that there will be no variation. Where the emulsion can be prepared wholesale by steam power, its employment is attended with no difficulties. In California it is prepared by oil companies and sold at very slightly more than the cost of the oil and soap ingredients. It is made after the following formula:—

Petroleum	2 gall.
Whale-oil soap (or 1 quart soft soap)	½ lb.
Water (soft)	1 gall.

The soap, first finely divided, is dissolved in the water by boiling and immediately added boiling hot, away from the fire, to the oil. The whole mixture is then agitated violently while hot by being pumped back upon itself with a force pump and direct-discharge nozzle throwing a strong stream, preferably ⅛-in. in diameter. After from three to five minutes' pumping the emulsion should be perfect, and the mixture will have increased from one-third to one-half in bulk and assumed the consistency of cream. Well made, the emulsion will keep indefinitely, and should be diluted only as wanted for use.

In limestone regions, or where the water is very hard, some of the soap will combine with the lime or magnesia in the water, and more or less of the oil will be freed, especially when the emulsion is diluted. Before use, such water should be broken with lye, or rain water should be employed.

For winter sprays dilute the emulsion with either 3, 4, or 5 parts of water, giving a percentage of oil approximately 17, 13, and 11 per cent. The strength in oil of this application on trees as compared with the oil-water sprays is the equivalent of 25, 20, and 15 per cent. oil, because relatively more of the heavier oil-soap emulsion is held by the bark. The two stronger mixtures may be used on apple and pear trees and the weaker one on peach and plum.

For summer applications dilute with 7, 10, or 15 parts of water, giving approximately 8, 6, and 4 per cent. of oil. The weaker strengths may be used on trees with tender foliage, such as that of peach, and the greater strength for strong foliage plants, like the apple and pear.

Miscible Oils.—It will be noted that the difficulty to be overcome in the use of oils is to effect their dilution to render them harmless to the plant. The dilution is effected with great accuracy by the kerosene-soap emulsion, and less accurately by the mechanical emulsions of oil and water. There have appeared during the last few years various so-called miscible oils, which readily and permanently mix with water, and can be applied with the same readiness and accuracy of strength as the emulsions of kerosene and soap. These oils have for their principal ingredients some form of petroleum rendered soluble by the addition of a percentage of vegetable oils and cut or saponified with an alkali, and they are, in fact, a sort of liquid petroleum soap. They are sold under various trade names. They have the disadvantage of costing a good deal more than the standard emulsions or the lime-sulphur wash, but have the great advantage of being always ready for immediate use without troublesome preparation. They cannot be diluted for winter applications against scale insects with more than 10 or 15 parts of water to give good results, and there is some danger of injury to the trees if they are carelessly or excessively applied. They have, however, a very useful place, and especially as furnishing a good insecticide where only a few trees are to be treated and the owner would probably not go to the trouble of preparing an emulsion or the lime-sulphur wash. They have been, so far, principally used against the San José Scale as dormant tree washes.

Fumigation of Nursery Stock.

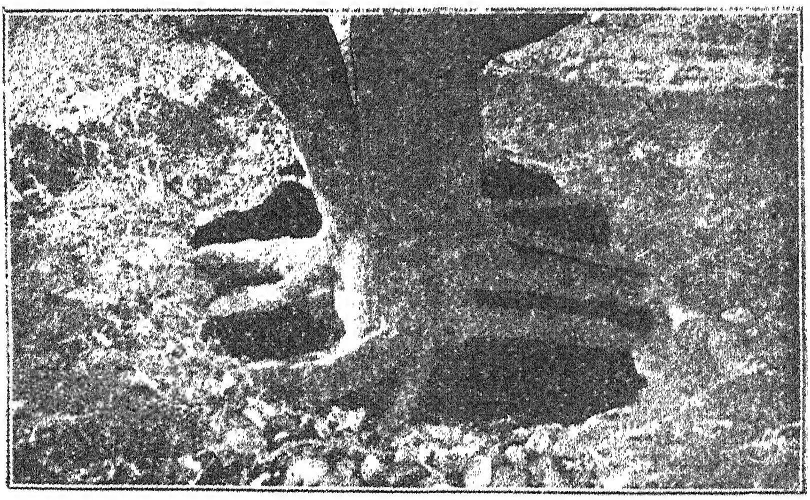
All nursery stock which is under the least suspicion of contamination with the San José Scale should be fumigated; and it is perhaps worth while to fumigate in any case to give the utmost assurance of safety to the purchaser. The hydrocyanic-acid-gas fumigation is the one to use. This gas is generated by combining potassium cyanide, sulphuric acid, and water. The proportions of the chemicals are as follow:—Refined potassium cyanide (98 per cent.), 1 oz.; commercial sulphuric acid, 1 oz.; water, 3 fluid ounces—to every 100 cubic feet of space in the fumigating room or house. The latter should be as nearly airtight as possible, and provided with means of ventilation above and at the side, operated from without, so that at the end of the treatment the poisonous gases may be allowed to escape without the necessity of anyone entering the chamber. The generator of the gas may be any glazed earthenware vessel of 1 or 2 gallons capacity, and should be placed on the floor of the fumigating room. The water should first be poured into it, then the acid, and, lastly, the cyanide should be added, preferably in lumps the size of a walnut. Promptly after adding the cyanide the room should be vacated and the door made fast. The treatment should continue forty minutes. *It must be borne in mind that the gas is extremely poisonous and must under no circumstances be inhaled.* The gas treatment is effective also against the scale on growing trees in the orchard; but the difficulty and expense of the treatment, except for nursery stock, make it prohibitive in the case of deciduous fruits.

SPANISH SYSTEM OF GROWING ORANGE TREES.

In the second edition of Mr. A. H. Benson's work on "Citrus Culture," he mentions "collar rot" and the remedy for this disease. He also states that, if an orange tree is planted on badly-drained clayey soil, no treatment will prevent or cure collar rot.

The Government Viticulturist of Victoria (Mr. F. de Castella), writing in the February number of the "Journal of Agriculture" of that State on "The Orange in Eastern Spain," describes a remarkable method adopted in that country for the prevention of collar rot. He says :—

"The most remarkable peculiarity in connection with the cultivation of citrus fruits in the Levante is the system of growing the trees over a hole, with the collar and starting point of the main roots exposed to the air. This system is very generally followed. It was at the Granja Valenciana (experimental station and school at Valencia) that I first remarked this curious method, but all the orange trees which I saw subsequently were treated in the same way. The photograph shows this very clearly. The tree is reared,



budded, and planted in the usual way, and until about three or four years old is treated much as we would do in Victoria. By this time its surface roots have become sufficiently strong to support it; a hole is dug underneath it, and the tap root is entirely cut off with a saw.

"The hole, which is a foot or so in diameter, and of about the same depth, is not filled up. It remains always open, any dirt or rubbish which may fall into it being regularly removed. When irrigating, which is usually done by flooding, a small dam is made around the tree at a distance of a couple of feet from it, to prevent water getting into the hole. The appearance of these trees is very striking; their bases may be compared to large spiders sitting over holes in the ground. The object of the treatment is to prevent collar rot and gumming (Mal de Goma), which used to be prevalent, but now seems to give little trouble. The sour orange stock is the one usually employed, even for lemons; lemons worked on lemon stock are said to be liable to Mal de Goma. The trees struck me as being very healthy. They were loaded with an abundant crop of fine fruit; in fact, everything seemed satisfactory excepting the price."

LEMON CULTURE IN ITALY.

EXPLANATION OF THE VERDEL SYSTEM.

Mr. G. Harold Powell (says "Australian Field"), in a lecture before the Lemon Growers' Club of Southern California, in Los Angeles, on "Lemon Culture in Italy," gave a detailed explanation of the Verdel system of lemon culture. Mr. Powell said:—

"The Verdel lemons are among the best known and finest lemons in the world. The Italians have developed this system to a remarkable degree. Verdel stands not for a variety of lemon trees, but for the lemons grown on any trees after they have been treated according to the method of the system.

"If the blossoms at the first part of the year are not prolific or other climatic conditions are unfavourable, and the crop seems destined to be small, the Verdel system is brought into use. The ground around the tree is removed, and the roots are allowed to remain exposed for a period of forty to sixty days, when a strong fertiliser, usually sulphate of ammonia, is placed on the roots and the soil laid over this. Irrigation must then follow constantly, the ground being kept moist all the time until the blossoms are brought forth.

"This insures a good second crop of lemons, the Verdels. The period of picking in Italy is about six months, during which time the fruit is plucked about every six weeks. The Italians have no systematised packing-houses, and each grower usually packs his own stock. The first-class fruit is all packed for export trade. The work is done chiefly by women.

"The second or by-product lemons are utilised in the manufacture of citrate of lime, from which citric acid is later manufactured. The presses and other machinery used in the manufacture of the citrate are nearly all hand or mule power. The finest oil of lemon and orange is made in Sicily. The best of all is produced in a primitive way by hand, and the oil is collected in sponges, dropped, when these are fully saturated, on water, and then blown off the water into any ordinary receptacle."

PIGS FOR THE ORCHARD.

In a district in Germany, the valuable pine forests were being seriously injured by the grubs of the pine moth, and the local authorities turned into the forest a number of pigs to see if they would be useful in destroying the chrysalides of the moth.

The result fully answered their expectations, for the pigs hunted eagerly for the chrysalides; in fact, they seemed able to find them by scent and eat large numbers.

Whereas previously it was not uncommon to find twenty chrysalides to the square yard, there are now hardly any.

And as regards the pigs it was feared that such a diet might make them ill, and that losses would be incurred, but, on the other hand, they have thriven wonderfully well, so much so that it has been decided to let them pass the winter in the forest.

It has been noted in this journal several times that pigs have been found most useful on orange groves, as they root among the roots and clear off fiddler beetles and fiddler grubs; their rubbing against the trunks of the trees also cleanse two or three feet of these of scale, moss, lichens (and White Scale seems to attack from below). The good youngs pigs do in an orange grove far exceeds the little harm their grubbing among the roots may do, and the untidy look of the grove may be excused for a few months, as this can be easily put to right again.

The best time to put pigs in a grove is from October to January, and also whenever the fiddler beetles are seen. Some people keep pigs in their groves all the year round with no apparent harm, but visible good. This has been sneeringly referred to as "pig cultivation," but net results are what must be considered.—"Journal of the Jamaica Agricultural Society."

NEGLECTED INDUSTRIES.

PAPAW JUICE.

The Papaw Apple (*Carica papaya*) has, since its introduction into Queensland many years ago, found a most congenial home here, not only in the Northern tropical districts but also in all parts of the coastal districts to the Southern border. Still, although the tree fruits heavily in the South, it grows in the greatest luxuriance in the North, where it is found not only in every garden and on every banana and sugar plantation but also growing wild in the scrubs, particularly around Cairns. The male and female flowers being borne on separate trees gives the origin to the name "papaya": and in tropical America the male tree is called "papaya," and the female tree "mamai." In the male tree the flowers are white, hanging in a cluster at the end of a long foot stalk, and this tree produces fruit which is, by many, preferred to that of the female tree whose flowers are larger, of a yellow colour, with so short a foot stalk that the fruit clusters close to the tree.

The ripe fruit has the colour and appearance of a rock melon. It may be used for pies, fritters, and other such purposes; and the unripe fruit makes good pickles, preserves, and, plain-boiled, after soaking to remove the milky juice, makes a dish quite equal to vegetable marrow.

The most remarkable thing connected with the papaw tree is the property possessed by the milky juice of its unripe fruit of separating the fibres of flesh, and thus making it tender. Newly killed meat suspended in the tree or wrapped in the leaves renders the toughest meat tender.

In connection with the medicinal value of the juice of the fruit, the "Philippine Agricultural Review," April, 1909, publishes the following extract from the annual report of United States Consul, A. J. Lespinasse, Tuxpan, Mexico:—

"Papaya juice is extracted from the fruit of the papaw tree, which grows rapidly, attaining its full bearing capacity in a year. It produces from 40 to 50 papaws of a dark-green colour, ripening to a deep yellow, in shape resembling a squash.

"A very light, superficial incision is made in the fruit, and a clear, water-like juice exudes therefrom, which becomes opaque on exposure to the air. As it drips from the fruit, it is received in a porcelain-lined receptacle. As it is very corrosive, metal receptacles would injure its appearance and qualities. It possesses great digestive virtues, and the refined article is considered superior to all animal pepsins.

"After the desired quantity has been collected, the juice is placed in shallow porcelain or glass lined pans, and allowed to evaporate. While this is not a very delicate or difficult operation, it requires considerable attention, so that the juice will dry uniformly, and the product be white and well granulated. In its granulated state it is shipped to the United States, where it undergoes a refining process, and is sold as the papaw of commerce for medicinal purposes.

"In extracting the juice, the hands should be protected by rubber gloves, as in its crude state it attacks the tissues. An average tree will produce about a quarter of a pound (4 oz.) of the granulated juice. It sells in the United States for from 4 dollars (16s. 8d.) to 6 dollars (25s.) per lb. in the crude state."

Now here is another of Queensland's neglected industries—one well adapted to the attention of the fair members of a farmer's or orchardist's family, seeing that there is absolutely no labour attached to the work beyond collecting and drying the juice. If papaw trees are planted out at distances

of 10 ft. by 10 ft., there would be on every acre 435 trees, each yielding 4 oz. of granulated, marketable juice, or nearly 109 lb. per acre. At 16s. 8d. per lb., this would realise over £80. The report, however, does not state whether Mexican or United States dollars are to be understood, but, supposing the former currency, the produce of an acre of papaws would be worth over £40.

In any case, seeing that papaws grow practically wild in the North and fruit heavily, the experiment appears to be worth trying.

With reference to the fruiting of the male papaw tree, Mr. Gabriel Kirk, of Moonwyra, Queensland, writing in 1902, stated that one of his male trees bore between thirty and forty fruits; the one here illustrated bore eighteen. We have ourselves seen several male trees bearing heavily at the State Nursery at Kamerunga; also, many trees along the railway line between Cairns and Kuranda may be seen bearing fruit dependent from foot-stalks 2 ft. in length.

A WEED-EATING TROPICAL CREEPER.

It appears that at last an antidote has been found to the noxious weeds which are so frequently the death of certain forms of plant and vegetable life in the East. Specimens of this "wonderful find" have been forwarded to the authorities at Kew Gardens. This plant is a blue flowering creeper botanically known as *Commelina nudiflora*, Linn., but called "rumput gremah" by the natives of Malayasia and "gewar-en" by the Javanese. Although the report made at Kew goes to show that this creeper is common throughout the Middle East, it would seem that the managers of estates and plantations have not known of its peculiarly welcome properties until very recently and accidentally.

The prolific weed known as "lalang" is the great enemy to rubber growth. It was the accident of observing that where the blue-flowered creeper came in contact with the lalang the latter became much less injurious that induced a planter to send specimens to Kew. It seems that at first one begins to notice that the weeds are becoming less prolific where the creeper is growing among them. This improvement steadily increases as time goes on, and it has been found that under the influence of this antidote lalang, which was formerly 5 or 6 ft. in height, has been reduced to only 1 or 2 ft. when it starts to flower.

But the joyful discovery having been made that here was an undoubted set-back to the weedy growth that chokes young rubber and is the bane of the planter's life, the question arose—Would the antidote itself exercise a prejudicial effect on the rubber? Therefore, the specimens were duly submitted to Kew, and, as stated to our representative, the new creeper is "unlikely to have any harmful effect on young rubber trees." Planters all over the East may, therefore, take heart of grace and also take this new "medicine."

In appearance the blue-flowered *Commelina nudiflora* is rather pretty, and, like the weeds which it first checks and then kills, it grows with astonishing rapidity. The particular estate whose manager made the discovery and acted upon it so promptly and satisfactorily is the Langkon Estate, in British North Borneo. The amount of rubber produced annually in the Straits Settlements is, of course, very large, and the results of the discovery and its successful application in a practical way are likely to be far reaching.—"Westminster Gazette," London.

[Mr. F. M. Bailey, Colonial Botanist, Brisbane, says it has long been known that this weed will overrun other plants and stifle them out of existence, but does not think that the substitution of one weed for another is a desirable thing. A variety of the *Commelina*, with its beautiful ultramarine blue flowers, is to be seen almost everywhere in Southern Queensland, where it is perfectly harmless to other plants.—Ed. "Q.A.J."]

Horticulture

FLOWER GARDENING. No. 19.

PLANTS SUITABLE FOR OUT AND IN DOOR CULTURE.

BY THE EDITOR.

CUTTINGS.

Many amateurs make great mistakes in planting cuttings. They leave three-fourths of the length of the cutting above ground, and very often push the cutting down by main force into the soil, which results in the bark being bruised around the base of the cutting just where the root-forming callus emerges, with the further result that the callus does not form and the cutting dies. Some cuttings strike so readily that it is almost immaterial how they are put into the ground. But most cuttings strike more readily by being inserted sloping-wise in the ground than when they are planted upright. Indeed, it is well to lay them in so sloping a position that their summits be not more than an inch high above the ground, and then earth up, covering all but the two uppermost buds. One secret of getting cuttings to strike is to firm the soil round the base of them, the top soil being left loose. Cuttings thus protected are not nearly so liable to become dried up and to perish as when almost their whole length is left exposed to the air. The end of the cutting which is to be inserted in the soil should be cut across with a clean cut, just below a leaf bud. Some gardeners are of opinion that slips strike more readily than cuttings. A slip is a small shoot pulled off a plant at its point of junction with the stem, bringing away with it a heel of wood and bark from the stem. None of the leaves, or as few as possible, should be removed from the upper end of a cutting.

A method of treating cuttings, said to be an American discovery, is as follows:—Lay a set of woody cuttings, either amongst slightly damped moss or else in a wide-mouthed bottle with a piece of damped sponge at the bottom of it. The cuttings, being lightly dropped in, are left for ten days or a fortnight in a cool, airy place. A piece of muslin should be tied over the mouth of the bottle to exclude dust and insects, but allowing air to enter. When a slight callus is formed, the cuttings are all but safe, and put out healthy roots directly they are potted. A heap of dampish moss or cocoanut fibre does as well as the bottle plan, only the air must not be quite excluded, and no chance of mouldiness must be allowed. (From "Indoor Plants and How to Grow Them.")

CHARACTER OF THE PLANTS PRODUCED.

In the "Magazine of Botany," Vol. VIII., Sir J. Paxton affords the following very valuable information:—

"In plants where there are two kinds of branches, one sort ascending and another branching along the ground like runners of strawberries, the difference is much the same as that between common shoots and suckers in ordinary shrubs and trees.

"The lower trailing shoots, employed for propagation, form plants very like those from suckers—healthy, vigorous, and disposed to occupy a large space, without blooming.

"Cuttings of the upper shoots produces flowering laterals in a very short time, and a fine blooming specimen may even be raised in one season by

taking off the extremities of the longest shoots as cuttings. Indeed, the dimensions and early blooming of the plant may be regulated by the distance at which the cutting is taken from the main stem.

"Cuttings from the extremity flower speedily, and in a dwarf condition.

"Cuttings from a shoot in an early stage of its growth will constitute larger specimens, and be longer in bearing flowers.

"All hard-wooded kinds of plants make roots best in clean sand, and soft-wooded require a light soil."

A simple method of striking cuttings is to take two flower pots—one large and one a few sizes smaller. Place in the larger one a layer of pebbles, broken bricks, &c., and a few inches of black earth. With a cork, plug the drain-hole of the smaller pot, and put it inside the larger one, centering it upon the layer of mould. Fill it with water, and fill the circular space between the pots with more mould. Insert the cuttings all round, and without further attention they will strike roots and thrive splendidly. The roots and fibres make straight for the sides of the water reservoir, though all the moisture they require is absorbed. If the packing of the earth in the larger pot has been properly done, the smaller pot can be lifted out now and then, and the process of root formation readily observed. Choose fine sandy loam for striking the cuttings.

Striking Cuttings in Water.

Fill large wide-mouthed glass jars with water. Into these introduce slips of, say, Salvia, Coleus, Calceolaria, Mimulus, or any of the same description of plants. In about two or three weeks or a month the little silver-like roots appear, and in a week or ten days afterwards they may be planted out in small pots.

Sir J. Paxton says that for this method of propagation—

"The cuttings should be of green wood, taken during the full growing season; such succeed best, and never flag beneath a hot sun. Very young spring shoots of Erythrinæ succeed in this way. When tubular or fibrous roots appear about the base, transfer to any light soil. Balsams and Dahlias propagate freely. Plants of the Melon tribe may be formed in a very short period (sometimes in three days), and, being transferred to small pots of light mould, will produce perfect balls of roots in less than a week."

The points to be attended to as most conducive to success are the following:—

1. That the cuttings be the summits of the youngest shoots in a state of vigorous growth at the time;
2. That capacious bottles be used, so that there be less likelihood of the water becoming foul;
3. That the water be changed often, to ensure its being quite pure;
4. That when changed it be tepid, so as to afford in some degree the bottom heat so essential for the speedy formation of a callus;
5. That the cuttings be sheltered from wind and sun, but otherwise have all the light and air possible;
6. That they be removed out of the cold air at night; and if the bottles be plunged half-way up in a tepid bath, probably so much the better.

Propagation by Layers.

Although propagation by layering is generally a much slower process than by cuttings, yet it is much surer, for there are few plants which, in a thriving condition, cannot be multiplied by this method.

The operation is very simple, but, at the same time, it must be carried out carefully as follows:—

Select a branch of ripened wood of the plant to be layered—one that will bear being bent down to the earth without breaking. Cut the branch

half through with a sharp knife, just under one of the leaf-buds towards its extremity, and then pass the knife upwards so as to slit the branch about an inch or two up. The slit piece, with the leaf bud at its extremity, called the "tongue," should be kept open by inserting a small piece of tile. Remove the earth to a depth of 2 or 3 in. from (or place a flower-pot over) the spot, just where the tongue falls on the branch being bent down; then carefully bend the tongued part of the branch into the earth or into the flower-pot; secure it in that position by a peg, and cover it over with earth, which should be pressed down and watered.

As this work is mainly intended for amateurs, I shall not describe the more difficult processes of Grafting and Inarching, but a few words on Budding will not be out of place.

BUDDING.

The art of budding may be much easier learned from one or two lessons by a practical gardener than by written instruction.

Budding may be performed upon any of the shoots of a full-grown plant if all the branches but the budded ones be cut away. But the proper method is to raise seedlings, or, in the case of roses, to strike cuttings expressly for the purpose of budding upon. The only implements required are a sharp penknife and a budding-knife, the latter like a miniature ivory paper-knife. A ball of cotton twist, bast, or worsted is also needed.

The time when the operation can be performed with success depends on the fit condition of the plant to be used as the stock. This can be at once determined by making a cut through the bark down upon the wood, and trying whether the budding-knife can be thrust freely between the bark and the wood. If the bark adheres firmly, so as to be only raised by tearing away, it is of no use to attempt to bud; but, if the bark is found to yield readily, the operation may be safely commenced.

How to Bud.

First clear the stock of any shoots or prickles which may be in the way. Make a gash through the bark, across the branch in the place where the bud is to be placed, and from the centre of this cut make another about 1 in. or 1½ in. downwards. The bud to be inserted must then be taken off the branch on which it is growing. Select a plump bud; and if, as is commonly the case, it has a leaf growing beneath it, cut the leaf off, leaving about a quarter of an inch of the foot stalk adhering below the bud. Then the bud is cut out by introducing a very sharp knife into the branch about half an inch above the bud, and slice down a thin piece of the wood with the bark and its bud upon it, bringing the knife out at about two-thirds of an inch below the bud. The bark, with the bud upon it, is called the "shield." The shield may be inserted in the stock in this condition, but professional budders generally take out the small piece of wood that was cut out with the bark. This is a rather difficult thing to do, as, without practice, the amateur may injure the eye of the bud; but it may be done without much risk of such a catastrophe by holding the shield in the left hand and thrusting the thumb nail of the right between the wood and bark of the upper part of the shield, and then removing the wood from the bark by pulling it off downwards, carefully keeping the bark all the while quite erect and inflexible. By adopting this plan a little wood may be left behind, but there is no fear of the eye being damaged. It may be mentioned here that American budders condemn the practice of taking the wood out. They say that the wood helps to keep the bud moist.

As soon as the shield is ready, gently raise the edges of the longitudinal cut in the stock with the budding-knife, and slip the shield down so as to lie on the naked wood of the stock; then cut the top of the shield off even with the crosscut, so that the upper part of the shield may lie close and even

against the crosscut on the stock. Then bind the whole round firmly, but not tightly, with the cotton twist, leaving the bud exposed. When, from the swelling of the shoot, it begins to be compressed by the tie, this must be loosened, and when the bud has pushed forth about a quarter of an inch the binding should be removed. The stock must not be headed close down until the bud has sent forth a considerable shoot.

Wood containing eyes for budding, if carefully packed in moss, may be sent a journey of many days, and prove as serviceable for the purpose as fresh-cut wood. In this simple way new roses may be procured from distant countries.

PRUNING.

Nearly all flowering shrubs are greatly benefited by being closely pruned after they have done flowering. They break out again with vigour and blossom in a much more compact and handsome form in the following season. The appearance of the plants is also vastly improved, as well as their tendency to flower more freely increased, by their being kept, as much as possible, to one stem, by stripping away all the lower shoots and leaves, so as to cause the stem to make all its growth upwards. The Heliotrope, treated in this manner, comes much earlier into blossom, and the process may be applied to many more shrubby plants.

Pruning forms an important part of rose culture. Some classes require hard cutting, and others little or none at all. The plants, when pruned, should be in a state of rest, and the chief object of the pruner should be to promote young growth from the base, bearing in mind that good flowers are only produced once on the same wood. All weak and exhausted wood should be removed, and the centre of the plants kept open, whilst all shoots tending to cross each other should be nipped off. As roses grow freely in this State during the greater part of the year, it is best to give a light pruning after each blooming period, and a heavier pruning just before the coming winter.

SEEDS.

For successful gardening no point is of more importance than that the seed procured for sowing should be both sound and of the finest kind. The saving of seed involves some little trouble, but it is well worth it. All flowering plants may be considered capable of being reproduced from seeds; and in a large majority of plants, though not all, that is the natural method. But, though seeds reproduce the species truly, that is not the case with varieties, unless they have, for a lengthened period, been annually subjected to a process of selection and careful cultivation, for there is a tendency in varieties to revert to the original character of one or other of the species whence they were derived.

HOW TO SAVE SEEDS.

1. Small Trees and Flowering Shrubs.—The seeds of many of these may be saved at once by merely gathering them when ripe upon the plants, drying them, and storing them away. The seeds of some are, however, exceedingly small and fine, and those of others immediately drop off on becoming ripe, so that, unless precaution be taken beforehand, they are all sure to be lost. A simple and effectual plan of securing them is to tie a piece of fine muslin round the stems of the seed pods before they ripen, so as to enclose them in a little bag, from which, when ripe, they may be removed at leisure.

2. Annuals.—Many gardeners think it needless trouble to gather the seeds of these, as they may be so easily obtained fresh and good from seedsmen and nurserymen who make it their business, particularly as several soon degenerate if sown repeatedly from seed, the produce of the original plants. A good way of securing the seeds of most annuals is to pull the plants up by the roots just before the seeds are quite ripe, and lay them upon a sheet of paper in a dry room, where the seeds will ripen even better than they would have done in the garden, and none that drop off will be lost.

STORAGE AND GERMINATION OF SEEDS.

The time during which seeds will retain their power of germination in an unimpaired condition depends upon many circumstances, storage and ripeness in particular. Great care is also necessary in the keeping of seeds to prevent premature germination, for very few seeds will revive if allowed to become dry after germination has commenced. All seeds should, therefore, be kept dry and in a low temperature till required for sowing.

A good plan is to store them in clean, dry, well-corked bottles, which will preserve them against the baneful effects of damp, and afford effectual protection against the attacks of insects.

Seeds of different plants vary greatly as to the time during which they preserve their vitality. Nearly all will retain their germinating powers for at least one year, and some for a much longer period under the favourable conditions above mentioned. The period also depends upon the nature of the constituents of the seed, whether oily or starchy. Oily seeds will perish in a comparatively short space of time, and require to be sown as soon as possible after they ripen, while those of a starchy nature may be kept longer.

Notwithstanding this opinion of the short-lived vitality of oily seeds, I lately had an experience which proves that some oily seeds will germinate after being stored for many years. I obtained from the Colonial Botanist, Mr. F. M. Bailey, F.L.S., in 1908, some seeds of the castor oil tree, which had been in a closely-corked bottle in the Technological Museum at the Agricultural Department for nearly twenty years. I planted six of these seeds, and five germinated. I allowed one to grow in my garden, and it bears abundant spikes of very large pods. Mr. Bailey was surprised at the result, as he strongly holds the opinion that oleaginous seeds will not retain their vitality for many months. Walnuts imported from England have invariably failed to germinate.

HOW TO TEST GERMINATING POWER.

The following is a simple method which may be used for many kinds of seeds:—Moisten a piece of thick blotting-paper with water, without making it dripping wet; fold it once, and place it upon a dinner plate. Take two lots of about 200 seeds each; distribute them fairly evenly on the blotting-paper, and cover them with another sheet of similar paper. This done, the whole should then be covered with another plate turned upside down, or with a sheet of glass, in order to prevent too rapid evaporation of the water, and be placed in a warm room. For each particular kind of seed there is a definite temperature at which germination goes on best, and in special instances, to secure accurate results, it is necessary to be able to control the heat supplied to the seeds. A temperature, however, of about 62 degrees Fahr., is suitable to most ordinary seeds. During the trial, remove the upper plate at least once or twice every day to allow the carbon-dioxide gas produced to diffuse away and fresh air to get at the seeds. Take away the germinated ones as soon as the germ shows itself, and make a note of the number.

SOWING SEEDS.

Nearly all flower seeds are very small, some of them being like fine sand, and they must, therefore, be sown near the surface, with only a slight sprinkling of soil over them; and no seeds should be covered to a depth of more than two or three times their diameter. Seeds should not be sown thickly, otherwise the seedling plants have to be thinned out, or they will be drawn. When the soil has been nicely worked to a fine tilth and levelled, it is well to gently pat it down with the spade to make it firm. Then sow the seed over the surface in rows or patches as desired. Cover very lightly and sprinkle a little fine, well-rotted manure over the soil; water carefully, and the operation is completed. The most natural period of the year wherein to

sow seeds is either in spring or autumn, or when they fall from the plants. Directions as to times and seasons for planting and sowing are given with the description of plants in the foregoing pages.

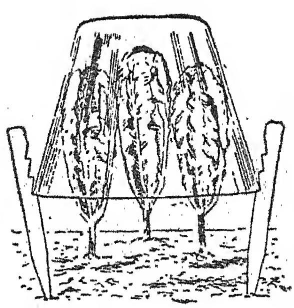
TRANSPLANTING.

When the young seedlings are large enough to transplant, choose a dull day for the work, and remember that, as a rule, few flowers flouish if planted or transplanted when the soil is overloaded with moisture. In drying, the ground becomes like pie crust, and the plant is starved because its rootlets are tightly bound up in the solid soil.

In transplanting, it is necessary to take into consideration the nature of the plant and its habit of growth—that is to say, think of the size to which the full-grown plant will attain. When removing a seedling from the pot or border, be careful to secure a ball of earth round the roots, using a trowel for the purpose. It will frequently happen that several plants are growing thickly together. These will have to be separated, and, consequently, the roots become uncovered; but the plant will take no harm if planted at once. In lifting a plant, great care and often much patience are required, so that the roots may sustain the least possible injury. Should, however, the roots be badly injured, put the plant into as small a pot as will contain it, fill in the pot with soil, and well water it; place it in a darkened room during the day, and bring it out in the evening. After a few days it will have recovered and may be planted out. The ground having been dug over and manured, mark off the positions which the plants are to occupy, open a space with a trowel sufficiently large to accommodate the plants which have been lifted with a ball, and carefully place them into it, filling in the soil around them and making firm. The seedlings with bare roots can be planted by making a hole with a pointed stick large enough to allow the roots to drop down and hang perpendicularly; the soil should then be filled in and made firm. Zinnias and Stocks can be planted in such a way as to allow for thinning, as they always produce a percentage of single flowers which are useless, and, as they flower when the plants are small, the single ones can be detected and pulled up, leaving the double-flowered plants plenty of room.

CLOCHES.

There is gradually being introduced into England, a French gardening utensil which is doing good work in the latter country. It consists of a glass cover, the general size of which is 17 in. in diameter at the base and 15 in.



high. Each one weighs about 5 lb., and in some designs is provided with a knob at its top for lifting purposes. These bell glasses, as they might well be called, enable gardeners to make large profits, since fruit and flowers can be

produced out of season at but a little cost. Some of the advantages are stated to be that no masonry or frames are required to protect the flowers from heat or cold: there is no waste of ground by walls; the cloches can be raised to allow the plants to grow tall; fresh air can be admitted at any moment, or heat retained, when necessary; each cloche is manageable by a child; and last, but not least, a reason which is applicable to Australia, they render the article free from dust, which frequently is so disagreeable about some ground fruits. Three sticks are driven into the ground and the bottom edge of the bell glass rests upon steps formed therein.

In France a new era in gardening and intense culture has been effected by the above transparent glasses or "cloches." These shelter plants from frost, snow, hail, and wind gusts. Lettuce, cauliflower, endives, strawberries, also all kinds of flowers, both in and out of season, are rapidly developed. The steps in the sticks enable the height of the glass to be raised as the plant grows.

REMEDIES FOR SNAKE BITES.

Bulletin No. 3, 1909, of the Royal Botanic Gardens, Kew, contains the following valuable information concerning two plants collected by Mr. E. St. J. Lawson, head of the police in Siam, which are stated to be very efficacious in the cure of snake bites in Siam. These two plants are (says Mr. F. M. Bailey, Colonial Botanist) natives of India. They are *Barleria Prionitis*, Linn., and *Justicia Gendarussa*, Linn. f. Mr. Lawson, in his letter to his brother, Dr. Arnold Lawson, F.R.C.S., says that of the two plants the first appears to have remarkable qualities in curing persons bitten by cobras, and the second *(Justicia Gendarussa)* is alleged to be still more efficacious. Mr. Lawson's report on an interesting case of snake bite mentions that a decoction of *Barleria* was frequently used and found efficacious, though it does not appear to have been able to avert death in the case of the bite of a hamadryad (king cobra), though death was delayed for a considerable time. The report describes the case of a Siamese snake charmer. During the previous three years he had been bitten by cobras at least ten times, but always cured himself by taking the medicine he kept for the purpose. One day he went out and caught two hamadryads, each about 7 ft. long. A few days later he took the snakes out of the jar he kept them in, and began to play with them. One of the snakes got angry, and bit him on the right arm, near the wrist. He then put away the snake, and, as usual after being bitten, took his medicine, but it did not have the usual effect, and in a few hours he was unable to swallow, and in twenty-four hours he died.

A memorandum attached to the report mentions that in all the doctor's experience of thousands of cases of death from cobra bite he could not recall a single instance in which the person bitten survived more than two hours. In the majority of cases death occurred within thirty minutes of being bitten.

The snake charmer above mentioned prepared his medicine as follows:—The leaves and twigs of a plant, named in Siamese "Salate phang poru" *(Barleria Prionitis)* are powdered in rice spirit. The liquid is taken internally, and the solid left after pounding is placed on the wound. The medicine must be taken immediately on being bitten. The proportions of plant and spirit and the proper dose to take are not given in the report.

On referring the matter to Mr. Bailey, the Colonial Botanist, he states that the plants named were natives of India, and suggested that it might be a good thing to import some and acclimatise them in Queensland.

Tropical Industries.

THE APPLICATION OF NITROGEN TO THE SUGAR-CANE.

There can be no question that the old system of exhausting the soil, by growing cane year after year (and often the same variety of cane) and neglecting to return to the land those plant food constituents which have necessarily been removed in large quantities, has frequently been responsible for poor crops and a consequent decrease in profits. No soil is rich enough to stand such a system for any length of time, and there is, moreover, no excuse for it in these enlightened days. No man would be foolish enough to allow machinery to get worn out for want of proper lubrication, nor would he expect an engine to do its work on an insufficient supply of the proper fuel. If only these principles were applied to the cultivation of the soil, we should hear very little about poor crops and exhausted land.

It stands to reason that the main object of the planter is to produce as much sugar as he can from his crop. The more successful he is in this, the more certain it is that his crop will consume a large amount of nitrogen, potash, and phosphoric acid, these being the three main constituents of plant food. It, therefore, follows that the vast quantities of these three essentials which are withdrawn by the crop must be systematically replaced if soil fertility is to be kept up.

While it will be found necessary in almost every case to supply some potash and phosphates, more often than not a considerable quantity of both the phosphoric acid and potash contained in the stripped cane is returned to the soil in the form of bagasse ash, so that less has to be supplied in artificial form.

With regard to nitrogen, it has been found that nitrate of soda and other nitrogenous manures exert a very favourable influence upon the yield of the sugar-cane—in fact it has been authoritatively stated that "nitrogen is without doubt the manurial constituent, the supply of which governs the yield of the plant." Again, the same authority states that "the effect of nitrogenous manurings appears to somewhat retard the maturation of the canes, and thus the juice of the canes manured with them is, as a rule, not so rich in saccharose as is that of canes grown without manure. But this effect is far more than offset by the larger yields of produce resulting from the application of nitrogenous manures, and to the fact that the increases produced by the nitrogen are principally due to the development of the stalks in length and in bulk, and not to the abnormal increases in the amounts of tops and leaves or the production of new shoots to the stool."

Two points must first be considered with regard to the application of manure to the land:—(1) It should be manured early with a suitable complete manure—*e.g.*, farmyard manure—so that, in the event of a drought in the early part of the year, the young plants may be better able to withstand its effects; (2) in the second portion of the year, when the cane stool has well developed its roots and is in a state of very active growth, a much more soluble and active manure is required than that used at an earlier period, so that the artificial manures should be carefully selected with this object in view.

This second manurial dressing should contain a fair amount of potash and phosphoric acid—a larger amount of the former than the latter being applied, unless that has been done in the original complete manure.

With regard to the nitrogenous manure, as remarked above, a soluble and active manure is required at this stage, and therefore nothing so good as nitrate of soda can be selected. It is extraordinarily quick in its action,

being immediately "available" by the plants, and is easily applied if mixed with three or four times the amount of dry earth. It must be remembered, too, that far better results will be got by applying it in two or even three dressings of small quantities than in one big dressing. "Little and often" is a good motto in this case, and will more than repay the small cost of extra labour involved.

With regard to the quantities of nitrate of soda to be used, it has been truly said that any attmept to lay down hard-and-fast rules in manuring would be liable to do more harm than good, but a careful study of the results of manurial experiments on sugar-cane leads to the conclusion that from 200 lb. to 300 lb. of nitrate of soda per acre is the most profitable amount, and that it should be applied in two or even three dressings.

Some discrimination must be used in the case of potash and phosphates, for while under some conditions the greater proportion of these constituents taken up by the plants is directly returned to the soil, under other conditions practically the whole of the produce is removed from the land, and must, therefore, be replaced, more especially in the case of potash.

It is well to remember that it is quite easy to allow your soil to get into a "run-down" condition, and thus incapable of producing good crops. It is not so easy to rehabilitate it. It is comparatively a simple matter, on the other hand, to keep it in good condition by paying attention to three main points:—(1) Careful and thorough preparation of the land; (2) systematic stirring of the soil; (3) the judicious use of manures with the object of replacing those elements of plant food of which the soil has been depleted. By these means the fertility of already productive land can be maintained and even increased, while more or less worn-out and exhausted land may be brought back to its original state of fertility. To show the advantages of adequately supplying the canes with the nourishment that they require, one has only to turn to any of the comparative tables of yields at the various centres where this is done. An island that is not mentioned in the following table is Trinidad, West Indies. The returns from this centre would show up rather poorly alongside the returns from Hawaii or Java, though it need not be so. Her soil, though formerly very rich, has, we understand, been allowed to go back in places, so that the returns per acre compare unfavourably even with Barbados with its coral subsoil, which is a distinct disadvantage. Both for cacao and sugar, Trinidad should be using many thousands of tons of fertilisers per annum more than she is doing. This lack of cultivation and manuring are the main causes of the disease in the cacao trees, and of the unremunerative returns from her sugar fields.

Brazil, according to Oakenfull, is in quite as bad a state. "The soil and climate of Brazil," says that writer, "are better adapted to the production of sugar than that of any other country in the world, but the planters have taken advantage of the fertility of the soil to such an extent that the yield per acre is now in places only about 50 tons per hectare (2½ acres)." Compared with this the returns from other centres, according to official figures, are as follows:—

	Tons of Cane per Hectare (2½ Acres).	Per cent. of Sugar.
Java, intense culture ...	80 ...	14 to 15·5
Hawaii, intense culture ...	82 ...	15 to 15·5
Egypt, with irrigation ...	38·5 ...	11 to 13
Argentina, with irrigation	40 ...	11 to 12
Demerara	62 ...	...
Louisiana	50 ...	11 to 13
Cuba	50 ...	13 to 15
Queensland	46 ...	...
Sao Paulo	50 ...	13 to 14·5
Campos (Rio)	50 ...	14·5 to 15·5

The authorities in Brazil are warning the planters that "it is useless for men to embark in enterprises in that country who are not prepared to work on the most approved lines, and those who think that they can do so in Brazil by methods which so impoverish their farms are enemies to the Republic. On the other hand, sugar will pay well if all is not taken out of the soil and nothing put in."

In his lecture at the Society of Arts last month on the forest belt, along the head of the Amazon, on the eastern side of the Peruvian Andes, Mr. Enock, who knows the country well, claimed that new lands there gave even a heavier yield of cane to the acre than did Java and Hawaii. If this is so, it shows how the land nearer the mouth of the Amazon, which was formerly quite as rich as that on the Peruvian "Montana," has gone back. When one remembers that sugar has been grown there since the discovery of Brazil, this exhaustion of the land is not surprising if manures have not regularly been applied. Reports tend to show that this most necessary operation has been conspicuous only by its absence.—"Tropical Life."

HOW VANILLA IS GROWN IN HAWAII.

Process of Pollinating the Blossoms and Curing the Beans—Profitable Business.

The growing of the vanilla bean of commerce has attained considerable importance in Hawaii, where a number of successful small plantations have been producing for a number of years. Jared G. Smith, late director of the United States Agricultural Experiment Station in Honolulu, gives the following interesting description of the growing of vanilla in his book, "Agriculture in Hawaii":—

"The vanilla bean is the cured and fermented fruit of a climbing orchid. The finished pods are very dark-brown or black, glossy, somewhat wrinkled on the surface, from 5 to 8 in. long and about as thick as a lead pencil. The vanilla extract of commerce is simply an alcoholic extract.

"The vanilla plant is grown either on a trellis or is planted at the base of a tree, so that it can clamber up the trunk. Any soil is suitable provided the drainage is good. It grows well in regions of abundant rainfall on the Kona (south or south-west) side of the islands. A mean temperature of 65 to 75 degrees gives good results.

"The plants are propagated from cuttings, which are simply lengths of the vine itself, from 2 to 6 ft. long. The length of the cutting has some relation to flower production, the longer ones yielding flowers in a shorter period. The leaves are cut from the lower end of the cutting, and the stripped portion of the stalk is buried horizontally under 2 or 3 in. of soil and rotting leaves. The upper end of the cutting is fastened to the trunk of the supporting tree, to which it soon becomes tightly attached by its aërial roots.

"The vanilla plant begins to flower during its second or third year, and continues flower production until seven or eight years old. Cultivation consists in keeping down the weeds and underbrush in the plantation.

"The vanilla plant only bears pods when the flowers are hand pollinated. This is a delicate operation not difficult to learn. Anyone who attempts it becomes quickly proficient, so that a good many flowers can be pollinated in the course of a day. The pod matures in from six to eight months, becoming hard, thick, and greenish-yellow. They are gathered before ripe.

"The curing process is a somewhat complicated one. After gathering, the green pods are spread out and exposed to the air for twenty-four hours, being roughly assorted into grades according to size. After being graded, the pods are sweated between the folds of woollen blankets exposed to the heat of

direct sunshine. During the period of fermentation, the pods turn dark-brown, become soft and leathery, and sweat freely. The pods are manipulated for several days until the proper degrees of colour and aroma have developed. After the fermentation, they are dried in the sun for a few hours and finally in cloth-covered trays in the shade with gentle heat. When fully dried—that is, when the pods no longer lose weight, but are still moist and pliable to the touch—they are packed tightly in tin boxes, and are again manipulated in bulk for one or two months. When completely cured, the pods are sorted to size and colour, tied in bundles, and these packages packed in tin-lined boxes which are soldered when full.

"The yield per acre in Hawaii has been estimated at about 13,000 pods, producing about 120 lb. of finished vanilla beans fully cured and ready for the market.

"The industry is a very profitable one for persons having sufficient means who will give this industry their personal supervision. The price of the vanilla bean depends as much upon the outward appearance of the finished product as upon its actual quality as indicated by aroma and flavour. Care is, therefore, necessary at every stage in the growth and fermentation of the crop.

"Five acres of vanilla in bearing should yield from 400 dollars to 500 dollars worth of beans per acre per annum after the third year. There are vanilla plantations in the Kona district, on the island of Hawaii, and in the Kona district of Oahu, near Honolulu. Much land is still available which is entirely suitable for the cultivation of this crop."—"Tropical Agriculturist," Ceylon.

CLEANING SUGAR APPARATUS.

A new agent for cleaning triple effets and other apparatus used in sugar manufacture has been placed on the market by the Camor's Chemical Company, New Orleans, La., U.S.A., under the name of "Camorsite." The company claim for it that it is the most efficient and thorough cleaner of sugar effets and vacuum pans that has, so far, been brought to the attention of sugar-mill owners. Camorsite is manufactured in concentrated powder form, which is dissolved at the factory and a solution made. In the worst cases, 2 or 3 per cent. of this solution is recommended to be added to the water required to cover the tubes, and then boiling is resorted to. When the apparatus is cleaned weekly, a 1 or 1½ per cent. solution is all that would be necessary to absolutely free the apparatus of scale. The Camorsite powders are put up in drums of about 200 lb. Each pound will yield 2 to 2½ gallons in solution. Quality "C" is sold at 30 cents (1s. 3d.) per lb., f.o.b., New Orleans. At this price the cost of a gallon would be 15 cents (7½d.). The usual process of cleaning tubes, &c., is by muriatic acid and caustic soda. The Camorsite does not, like muriatic acid, emit any deleterious gases, nor does it corrode or destroy metallic roofing or injure the pan and effets as the acid does.

The principle on which Camorsite works is based upon its affinity for lime salts—such as sulphates, sucrates, and carbonates—which is destroys wherever found. The product is also a great degummer. It has been used in small quantities with great success in facilitating the flow of thick juices through the filter presses and in dislodging massecuite in evaporating pans and juice cars. It is of great assistance in cleaning filter cloths. Boilers: As the scale formations in boilers are analogous to those of the sugar apparatus, with the exception, however, of the sucrates and gums, Camorsite is especially valuable. It is applied in very minute doses, only 10 grams of a 5-degree Beaumé solution per degree of hardness and per 250 gallons of water evaporated. By this process all salts of lime and magnesia are transformed

into insoluble products, thus preventing scale formation, and the tubes and sheets of the boilers are coated with aluminum. This happy formation is especially valuable to sugar planters who are obliged to lay up their plants a greater part of the year. They will find their boilers, on resumption of work, free from rust.

NEW SYSTEM OF RUBBER-TAPPING.

A new system of rapid tapping of rubber trees has given rise to much comment in Ceylon.. The inventors are Messrs. Lee, Hedges, and Co., and they claim for their method—(1) Cost of plant not above usual current methods; (2) simplicity; (3) reduced cost of production; (4) little or no apparent damage to the trees; (5) labour-saving; (6) quicker and possibly increased returns.

A correspondent of the "Ceylon Tropical Agriculturist," writing on the subject, says:—"In connection with the new tapping system of Messrs. Lee, Hedges, and Co., on which Messers. Joseph Fraser and Clements' report is eagerly awaited, it is of interest to recall that Mr. Petch, the Government Mycologist, has spoken against the use of the pricker on several occasions, and I understand he has not yet seen any reason to alter his opinion.. I hear, too, that the new method of tapping rubber, which is now being boomed, involves the use of the pricker. If it does, the inventor must wait until he can demonstrate what is the condition of the trees two years after tapping, before he can speak of the success of his method. But Dr. Willis has given his approval of the system, though I cannot discover that he has considered the pathological side—the structure and reactions of a Hevea tree. I am strongly of opinion that the use of the pricker causes the formation of lumps on the renewed surface, and makes it untappable. You have only to look at the trees Mr. Herbert Wright tapped at Henaratgoda two years ago."

The "Tropical Agriculturist" (Supplement, April, 1909), says:—

"EARLY YIELDS *v.* QUALITY—DOUBTS AND FEARS.

"The new system of tapping rubber is attaining very considerable popularity. It is the chief topic of discussion in rubber-growing circles. It promises to shorten the wait of the planter; and impatient shareholders are already feverishly revising their prospects in the light of its advent. "Our estimate for the year is so and so; *but, with the adoption of the new system of tapping, we expect that this will be greatly increased*," has become as essential (and as stereotyped) a part of a rubber company chairman's annual speech as the time-honoured and hoary formula, "The report has been in your hands for the usual time, and with your permission we will take it as read!" It is natural enough that any method of dealing with rubber trees, which will render them productive two years earlier than was anticipated when they were planted, should absorb attention to the exclusion of all else, and we can probably accept as true the current Fort report that already some 120 Ceylon estates have subscribed to the new method. The pre-eminent advantages claimed by the new system are:—Simplicity; reduction in cost of production; little or no damage to the trees; reduction in labour force required; and quicker and increased returns. The last of these is undoubtedly the one that has proved the most attractive to producers and shareholders; and now that they are becoming accustomed to its dazzling glamour, which for the time obscured all other issues, they are beginning to realise that there are two sides to the shield. Doubts and fears are forcibly obtruding themselves on the halcyon outlook. Two points in particular are being much discussed; and in our opinion these must be satisfactorily answered and proved to the hilt by experience before the new tapping method can be pronounced

an unqualified success or hailed as a genuine benefaction to the plantation rubber industry. It may be safely assumed, so attractive are the claims of the new system, that the great majority of planters possessing rubber at all approaching a tappable age will take it up, for—according to Messrs. Lee, Hedges, and Co.'s original circular, reproduced in T.A. for December, 1908—"by adopting this system it is possible to secure from young trees (three-year-old and upwards), which cannot under present conditions be profitably tapped, a remunerative yield at a low cost not possible by any other known method." What must be the inevitable result of this? In a very short time a large quantity of inferior rubber will be thrown upon the market, prices must drop, and the fair name of the Ceylon product is bound to suffer in the eyes of the buyer. The inferiority of rubber yielded by young trees is a matter beyond cavil. "Increase in age," says Wright in his "Pará Rubber," the standard work on the plantation industry, "is certainly to be associated with an improvement in the physical properties and quality of the rubber, whether one considers plantations of different ages or parts of the same tree." Again, observers have shown that "rubber from young trees is adhesive and lacks the required elasticity and strength." Stanley Arden has shown that in parts of Malaya the rubber from trees three and a-half to four years old is decidedly inferior. The "India Rubber Journal" is quoted by Mr. Wright as having described samples of Pará rubber from four-year-old trees "as being soft, and would not stand much working on the machine, while the value put upon them was only equal to that for 'Congo ball or a similar quality of African.'" And, finally, we may quote the opinion of Mr. Wright on the subject, applied directly to Ceylon:—"When one considers that the growth of the Pará rubber tree in Ceylon is such that a circumference of 20 in. cannot be attained much before the fourth, fifth, or sixth year, it is obvious that, under ordinary methods of cultivation, *all ideas of extracting rubber from trees under these ages should not be encouraged.*" It is, therefore, abundantly clear in our opinion that early yields and correspondingly quick profits may be obtained at a far greater cost than the 500 rupees necessary to be put in possession of the secrets of the new system.

As to the effect of the system upon the tree itself, we are precluded from discussing this freely because it would be unfair to the inventor of the method to publicly state the manner in which latex is extracted under his system. It is, however, generally known that the bark of the tree is conserved and left practically intact. It is upon this point which doubt exists. Rubber is extracted at present by removing the bark of the tree: the existing doubt, as put to us, is "whether, after a period of tapping, the latex cells will refill and continue to yield rubber." The point may be better understood when we remind our readers that "the bark, or—as it is better termed—the cortex, is formed from within outwards; new cells are continually being formed which push the older ones outwards. All these cells, at some time or other, are liable to undergo decomposition and to assist in the production of well-defined tubes which become filled with latex." Will this action continue when the tree has been tapped some time under the new system? Two years is the time estimated to elapse before this can satisfactorily be proved by experience. Personally we do not regard this as a grave menace to the industry, although it is a point upon which we should like to have the opinion of a competent scientific authority. It would appear, however, from an opinion expressed by Mr. Herbert Wright, in a lecture at Kegalle (assuming the point above alluded to is satisfactorily settled), that the new system is well-calculated to effectively prevent the danger of vital injuries to the tree being effected during tapping by the old method. Mr. Wright said:—

"It is not in the extraction of latex that the harm is done, so much as in the removal of the bark containing that substance. The bark or cortical tissue, which is removed in tapping operations, contains organised systems of

elements which are of vital importance to the plant, and on their health and continuity depends the perfect distribution, mainly from above downwards, of the food materials elaborated in the leaves. As a store-house and conducting channel the cortex is of vital importance to the plant, and, if it is removed too quickly, the life of the tree may be endangered. The rapid stripping of the bark is an unnatural process, analogous, perhaps, to the treatment meted out to cinchona trees—though they did not flourish long—but not comparable with the natural peeling away of dry bark. During ordinary tapping operations the cortical cells are exercised while they are in a living condition, and are entirely removed at a time when they contain reserve food intended for the use of the plant; it also differs from the natural peeling of the bark, in so far as the average operator exposes the inner and more delicate and vital components of the cortex and cambium to atmospheric influences. Such treatment does affect the vigour of the trees; and if cortical stripping is effected much more frequently than once in three or four years, I anticipate trouble in the future."

It is well in this connection, and in connection with the letter which appears elsewhere of Mr. H. A. Wickham (the veteran introducer of Amazon rubber into Kew, whence it came to Ceylon and the East), to remember that the lactiferous system of the rubber trees has no vital association with other parts of the tree, and is not like the circulatory system of human beings; it is almost useless during the life of the tree and persists when the tree is apparently dead.

The latter of the two points dealt with above is, however, one upon which our scientific advisers are best able to sit in judgment. If they pronounce the system one which can be safely practised, it is certainly going to be a splendid thing for the industry, if utilised only on matured trees; because in other respects it undoubtedly does all that it claims. The first point comes within the comprehension of all interseted in the rubber industry. By sending rubber from immature trees to market, we may secure quick returns for a time; but the rubber is bound to be less resilient and strong than that of our competitors taken from older trees. It will snap when stretched, and the inevitable tendency will be to throw the Ceylon plantation industry into disrepute with the buyers. This is a serious consideration and one that should be carefully weighed before the new system is applied to thousands of young trees, the rubber from which is not really fit to be placed on the market.

METHOD OF TAPPING ASSAM RUBBER.

The "Experiment Station Record" (No. 11, 1908) furnishes the following account of an improved method of tapping Assam Rubber (*Ficus elastica*), together with the results of some tapping experiments carried out in India, in which this method was used:—

The tapping instrument consists of an ordinary carpenter's chisel from ½-in. to ¾-in. wide. This is driven into the bark vertically in a series of cuts, each the width of the chisel, across the direction of the trunk or branch being tapped, and with at least ½-in. space between each incision. The rows of incisions are made about 6 in. apart on the stems and branches of the tree. Thin strips of lead are secured to the stem underneath each row, by which the latex is conducted into cups. By this method of tapping about two-thirds of the latex is said to find its way into the cups, while one-third coagulates on the cuts.

In 1905, eight trees planted in 1882 were tapped in this manner, and gave an average return of 6 lb. of rubber per tree. The same trees were again tapped in 1906, and the yield for individual trees varied from 2½ lb. to 10 lb. Four trees, planted in 1880 and 1890, were tapped in a similar

manner during the same years. In 1905-6 the estimated yield per tree was about 2 lb. of rubber, and in 1906-7 the yield per individual tree varied from $1\frac{1}{4}$ lb. to $3\frac{1}{4}$ lb. With this method of tapping, the cuts made in the previous year appeared to heal well and to be hardly noticeable, and it is thought probable that the Assam rubber trees may be tapped more frequently than by the older methods o ftapping in which the bark is seriously injured.

The latex coagulating on the cuts is said to require no further treatment. That gathered from the cups is mixed with a 2 per cent. solution of formalin, poured into clean bamboo troughs and covered from the direct rays of the sun. The coagulation is said to be complete within a day's time. After the strips of rubber have dried they are rolled into balls.—"Agricultural News," Vol. VIII., No. 176, page 27, 23rd January, 1909.

USE OF ACETYLENE GAS REFUSE AS A MANURE.

BY J. C. BRUNNICH, F.I.C., Chemist to the Department of Agriculture and Stock.

Frequently the question is asked—if the refuse obtained from carbide of calcium in the manufacture of acetylene gas may be used as a manure. This refuse consists almost entirely of calcium hydroxide, or slaked lime. A sample which was analysed in our laboratory some years back contained about 66 per cent. of lime as hydroxide (corresponding to about 50 per cent. of pure quick-lime), about 1 per cent. of insoluble matter, sand and impurities, the rest being moisture. Some refuse from cheap inferior carbide, which no user of carbide should ever buy, and which is characterised by a peculiar dark grey and even reddish colour, may contain some impurities injurious to plant life. The refuse of a good quality carbide may be safely used as a substitute for slaked lime by farmers and others.

Lime itself is not classed as a manure, although it is absolutely necessary to plant life, and the absence or want of lime may be the cause of the infertility of many soils, and also may be one of the reasons that the application of artificial fertilisers occasionally shows little or no improvements in the crops.

Lime is generally used at the rate of 10 cwt. to 2 tons per acre, and, as a rule, at the present day the smaller amount applied more frequently is preferred to the very heavy dressings. Lime is used in the form of quick-lime and slaked lime, and the latter, which is found in the acetylene refuse, is slower in the action than the former, and cannot, therefore, always replace the former, particularly for the improvements of heavy clay soils.

Both the oxide (quick-lime) and the hydroxide (slaked lime) are very much quicker in their action than carbonate of lime (limestone and marble) and sulphate of lime (gypsum). Lime when applied to the soil as a top-dressing gradually changes into the more insoluble carbonate by absorbing carbonic acid from the soil and from the air.

Recently an article on "Experiments with Acetylene Refuse," carried out at the Wye Experimental College, in England, appeared in the "Gardeners' Chronicle," and was reprinted in the "Acetylene," in which as a result of the experiments great caution in the use of this acetylene refuse was recommended.

In these experiments soil was treated by being mixed with 1 per cent., 10, 20, 30, and 50 per cent. of acetylene lime refuse; and in all the soils so treated, except in the pots containing 1 per cent., and in the ones containing pure soils, the plants refused to grow. I am quite at a loss to understand how anyone could expect a growth in soils treated with such enormous amo unts

of lime; and even the addition of 1 per cent., the smallest amount used, corresponds in a soil to a depth of 6 in. to a dressing with 7 to 9 tons of lime, which no practical farmer would ever dream to apply. I think it rather a recommendation than otherwise that the seedlings in the pots containing 1 per cent. of lime did nearly as weell as in the pots containing no lime.

Most of our soils will stand and will be benefited by a light dressing with lime or acetylene gas refuse, at the rate of about 1 ton per acre, amounting to about ½ lb. per square yard, which value will give the amateur gardener an idea how much to put on his beds.

COCOANUT CULTIVATION.

Dr. D. W. May, Director of the Experiment Station of Porto Rico, Leeward Islands, West Indies, in discussing the cultivation of the cocoanut in an article in the "Porto Rico Horticultural News," said:—

In planting cocoanuts it is important to select only fine, ripe seed nuts, the produce of healthy, well developed trees, of good bearing capacity. The ripe nuts are first set out at distances of 1 ft. from each other in holes 2 ft. deep, and with about 2 in. of the surface of the nut exposed. It is important that this seed bed should be kept moist but not wet. After a period of from four to six months, the young seedlings will have reached a size at which they can be transplanted to the ground in which the trees are to grow. The seedlings should be set out at distances of 30 ft. each way. I tis a good plan to keep the soil around the young trees mulched with leaves and trash, as this has a helpful effect on the growth of the palms.

The cocoanut palm responds well to cultivation and applications of manure. The practice of green manuring is frequently recommended for cocoanut groves, and it is found that by growing crops of beans between the trees, and digging the vegetation into the ground, growth of the palms is considerably hastened.

Cocoanut palms bear transplanting well, and it is recommended that, if the young trees do not appear to be flourishing, they may be taken up, some manure and trash worked into the hole, and the trees replanted.

The period at which the cocoanut palm begins to bear fruit varies from five to ten years, depending largely upon the location and the care given to it.

The fact that cocoanut palms are so commonly seen growing along coast lines and sea beaches indicates that the trees will do well in sandy soils. Probably, however, they flourish best of all on deep alluvial lands, such as those found near the mouths of rivers. A clay soil is very unsuitable for this crop. Since the saline surroundings of the sea coast is so congenial to the palms, it is customary in many countries, when the trees are planted inland, to place several pounds of salt in the holes in which the seedlings are set, with the object of making up for the want of saline constituents.

A good cocoanut tree should yield an average of 100 nuts per year, and under favourable conditions 200 have been obtained. Taking the whole island of Port Rico, however, a return of 65 nuts per tree is probably about the average figure obtained, and no doubt conditions are very similar in the British West Indian Islands. This low return indicates the general want of care and attention from which the industry is suffering.

The cocoanut palm will continue in bearing for so long as seventy or eighty years. During the early years of its growth, catch crops of various kinds, as provision crops, &c., may be planted between the trees, or, better still, leguminous plants, as cowpeas or velvet beans.

Science.

THE POTATO DISEASE.

[*Phytophthora infestans* (Mont.), De Bary.]

BY HENRY TRYON, Vegetable Pathologist and Entomologist.

NOMENCLATURE.

This potato malady is known under many names, of which the following may be mentioned:—Blight, Late Blight, Potato Murrain, Potato Rot, Potato Mould, Downy Mildew, Brown Rust (Tasmania), La Maladie des Pommes-de-terre, Kartoffelkrankheit, Krautfaule, Knollenfaule, Aardappelzickte, Marciume della patate, Male de secco, La Peronospora, Phytophthora. Probably the last mentioned is to be preferred, since it has allusion to the most essential feature of the malady, the growth within the potato of a parasite—a fungus, first designated—by Montagne—*Botrytis infestans*, and now known as *Phytophthora infestans*, De Bary.

INTRODUCTION.

The fact of this disease occurring in Australia was discovered by the present writer, as well as first made known to the Department of Agriculture by him, on 18th May, 1909. This discovery related to its existence in a district near Brisbane, and had reference to a virulent potato affection brought under notice as occurring on a single farm, but actually more locally spread, by Mr. R. G. Ridgway. Subsequently, on 26th June, he similarly intimated that it was prevalent in potatoes that were being received in quantity from Tasmania, and that were affected by a malady, apparently identical with one that had already received there the descriptive name—"Brown Rust."

In the interval between the dates referred to, evidence was received that indicated that the Phytophthora disease already occurred throughout the large area of south-east Queensland, that extended from the southern border of the State northwards to beyond Gympie, and as far back as the coastal range in some places. The vigorous measures for its extermination, that were at once entered upon on its first discovery in Queensland, were accordingly, therefore, suspended.

The source whence this disease was derived can be alone conjectured. Prior to its existence in Tasmania having been discovered, this was attributed to New Zealand, in which *Phytophthora infestans*, already noticed there in 1904, had previously become generally established, the statistics of Queensland showing that, notwithstanding the embargo placed on potato importation from countries where it occurred, this colony had, to some extent, contributed to our market supplies. There, however, is now no necessity, perhaps, to seek its origin in seed potatoes emanating from the Dominion, in view of the knowledge referred to.

SYMPTOMS.

Although the destruction of the potatoes or tubers themselves may result from the disease, the first symptoms of its presence occur in connection with the parts above ground. When infection is first brought about there is no outward sign for a few days of this having taken place. There gradually arise, however, pale yellowish blotches on the leaf-blades, often separate from their margins, but usually at their points or along their

sides, and these, as they become more conspicuous, increase in size. From yellow they change by degrees to a deep dull muddy brown. Meanwhile the leaves thus affected may become misshapen and have their edges here and there turned upwards, so as to expose the under surfaces. Viewing one of these leaves from beneath, it will be observed that, immediately surrounding the blotch on all sides, there is an indistinct band of a pale-grayish colour, that becomes more apparent when it is held slantingly, and is apparently composed of some extremely fine dust-like matter. Attempting to look through it, it will be observed that, not only does the spot itself obscure the light, but that there is a dark zone beyond it, corresponding to the position of the gray fusiness beneath, suggesting that the presence of this, and the leaf-discolouration, are in some way connected. Usually, when the leaf-tips and sides are occupied by the dark-brown (almost black) patches, there is more or less surface-crumbling of the parts they occupy, and, should drying winds be experienced, these may become cracked and brittle, even before the full discolouration is effected. The spots, in fact, present their most characteristic appearance when the foliage is moist, especially before the night dew has risen. Whilst the atmosphere continues dry the fusiness referred to either does not appear at all or soon vanishes on this happening.

In fact, under these conditions, and with a humid atmosphere, the spots both increase in size and multiply until the entire leaf is brown and dead; and the leaf-stem, meanwhile having become brownish-coloured and translucent, droops too in the process of its succumbing.

A potato plant may be smitten in this way at any stage in its growth; although, if approaching maturity, it is more likely to become affected. Usually, in a plot or field of potatoes, the disease manifests itself in spots here and there in the first instance, the whole area being later affected. These spots usually mark the site of surface-depressions. In damp, muggy weather, when rain or fog is about and the sky overcast, these symptoms will be developed and become general in a potato area with remarkable rapidity, the field soon presenting an appearance of having been visited by severe frost, for sooner or later the "tops" are killed.

With regard, now, to the tubers or potatoes. The *Phytophthora infestans* being a parasite that attacks the plant at any stage of its growth, and being capable as is seen of killing the "top" or part of it above ground, the tubers on being removed from the soil—when this has happened—will be at the stage of development and size that has been reached at the time that this destruction has been brought about. There will be no crop of marketable tubers, such as culinary purposes require; a crop of immature potatoes of medium size; or ones such as are ordinarily harvested. This, however, will only happen when the manifestation of the disease on the foliage is followed for some days by dry or rainless weather, and the soil is of a light texture or approaches that description. (Note.—This is what actually was experienced in many places within the disease-infested area of Queensland, during the outbreak that has occasioned the preparation of this article.)

On the other hand, should these dry atmospheric conditions be replaced by more or less rain, the tubers themselves will also manifest symptoms of the presence of the disease. The earliest of these are practically indiscernible on a dark-skinned potato-tuber; but should a white or pink-red one be examined, it will—if affected—exhibit an ill-defined cloud-like patch, or patches, suggestive—by reason of the dark colour displayed—of a light bruise having been experienced. This symptom is especially brought to light when the surface of the tuber is made wet as in washing. In peeling the potato when preparing it for the

pot, the occurrence of surface discolouration will also be found now. More fully developed effects that may be seen in all kinds of potatoes, are —in one or more places—a discoloured death-like appearance of the surface, that presents also here and there shallowly impressed pits or dimpling. Then the peel may become dead, and sunken inwards to a slight extent, especially should the potato have been under conditions of dryness. Very frequently the skin of the potato covering these affected places will have become broken and partly removed; and it will always be found, if it be still *in situ*, that it is easily removable with the finger-nail; in fact, mere rubbing will often detach it. Immediately beneath the surface where these changes have been undergone the flesh of the potato will be found to have lost its white colour, that has given place to a brownish-yellow or yellowish-brown. This change is at first quite superficial, but eventually it will extend inwards for some distance, the tissue being at first densely mottled and then speckled with a brown rust-like colour. This is especially to be seen when the affected potato is cut across, the entire section being oftentimes girdled with a band, ragged internally, of uneven width of this peculiar hue that merges outwards with the tuber surface.

Should the potato, in which these symptoms due to the Peronospora disease are present, be kept dry, it will remain in the condition described, but in the damp soil, in the potato heap, in the pit, or even when bagged, decay will proceed, and it will be destroyed, becoming collapsed and filled with matter of a pap-like consistence.

These destructive changes, however, are not essential features in Phytophthora attack, it is merely the harbinger of them, the destruction of the surface tissue permitting them to be brought about by the entrance of soil-frequenting bacteria and moulds that are almost always associated with ordinary potato-rottenness; for the Phytophthora is a true parasite, only establishing itself in the sound tissue of the potato, and actually perishing for the most part when this undergoes these changes that constitute decay.

CAUSE.

If the fine powder-like substance that surrounds the spot due to the disease with a delicate gray band, occurring on the under surface of the leaf, be examined with a magnifying glass, it will be seen that it is composed of minute glistening particles of one size, these are fungus-spores or fungus-seeds, and with them and their growth the disease is brought about. They may appear in number to millions on a single leaf.

These spores or conidia (Greek for dust) readily become detached, float in the air, and are transported with its movements. They are capable of growing as may an ordinary seed, but—unlike it—in more than in one manner. Should they not have been long formed, and find themselves in a droplet of pure water (*e.g.*, rain water or dew), they give rise to further or secondary seeds or sporules, several of these arising from each of them, and these that are capable of movement in fluid and are thus termed zoo-spores (living seeds), eventually sprout. If on the other hand they have alighted in a nutrient fluid of sufficient strength, or are older, they produce sprouts directly themselves.

Now, these sprouts, or germ-tubes, on having issued from conidia, or from zoo-spores, that have arisen or have fallen on a potato leaf, can, under the circumstances in which they find themselves, penetrate through the skin of its surface into its interior, and—this having accomplished—send branches through the substance of which it is composed, producing the special colouration in so doing and the decay that we find in the blotch, that we regard as the first symptom of the disease.

If on the other hand the conidia are washed off the leaf during rain, the zoo-spores, entering with their liquid surroundings the soil, gain the tubers, and settling thereon send forth germ-tubes that penetrate the skins of these, and produce in them related changes also.

It is unnecessary, for the purpose of this paper, to describe the fungus on which the spores or conidia are developed, its appearance and mode of life in its vegetative condition within the substance of the leaf, or amongst the tissue cells that compose the more superficial parts of the tuber, that it has once entered. Nor need we dwell on how it lives, nor the nature of the destructive changes that this living involves, and that, in the case of the potato itself, afford the opportunity for the entrance and operations of more virulent substance-destroying organisms.

ESTABLISHMENT AND DISSEMINATION.

In dealing with the symptoms of the disease, allusion has already been made to the fact that, although the tuber be infected, it may exhibit little outward evidence of this being so, and that thereupon—as also when the fact of infection is quite manifest—tubers will remain, for a time at least, intact, and undergo no further change whether of the nature of decay or otherwise, when maintained under conditions of dryness. The Phytophthora disease is not, however, banished from them, the parasite that lends it its name living dormant in the narrow spaces between the cells that compose its tissue, ready to develop further when congenial circumstances arise. Thus, if a portion of such a potato be maintained, or find itself in a humid atmosphere, it will give rise to the same fungus and fungus conidia that we have seen occur in connection with the leaf spots. Without stopping to explain how this is brought about, it may be assumed, therefore, that a potato, or portion of a potato, harbouring the dormant vegetative form of the parasite will, when planted, originate in many cases disease in the living potato plant formed from its growth; and even, if left about—as when cutting affected potatoes for stock—may do so also.

That fresh centres of disease become established in this manner is an undoubted fact, the recognition of which has been the justification for the establishment of prohibition with respect to commerce in potatoes between disease-affected and disease-free countries. The smaller potatoes often used as seed are especially dangerous; not only has it been shown that these are especially subject to infection by the parasite by reason of their delicate skins, but to harbour it in an indiscernible state—in this dormant state—from one year to another, on account of the facility with which they dry.

As concerning persistence of the disease, the great variation in the time selected for planting potatoes even in a single Queensland locality, covering two months or more, and resulting in crops of widely different ages being grown at the same time, brings it about that in some districts there is an almost continuous growth of potatoes from one end of the year to the other, without any interval between winter and summer planting. This will probably prove conducive to the perpetuation of the Peronospora disease.

Again, when the spores or conidia find their way into the soil, they may meet with conditions, neither at once favourable to their growth nor conducive to their destruction, and so will persist for a while intact as old spores, or they may reach a nutrient pabulum in which they can at once grow. In either of these events they will give rise to freely-branching spawn threads (mycelia), that may subsequently infect potato plants with which they may come in contact. It may be understood then that, of two

potato crops that are grown successively on the same ground with a short interval between them only, one may prove a source of infection for the other. Old potato plants and potato refuse left on the land, as well as defective harvesting, may procure the same undesirable result.

When the disease is once present anywhere, and has developed the outward symptoms of its presence, it is readily disseminated by the wind, especially should humid conditions occur to promote the growth of the spores on these having been carried by it from diseased to healthy plants. During the course of this first Queensland outbreak, several instances were met with of a succession of attacks along the course of a prevalent wind. A remark that applies to both tomatoes and potatoes; that proved reciprocally infective one to the other. If other conditions conduce to render this agency for Phytophthora dissemination operative, the wind has evidently a great influence in effecting the distribution of the disease.

During the months of May and June the potato crops throughout the area visited by *Phytophthora infestans* were infested to an unusual degree by the smaller insects that subsist on cell-sap—*Jassidae* and *Aphides* especially—but it could not be definitely ascertained that they assisted in conveying the spores from one part of the plant to another, or from plant to plant.

When sound potatoes are stored with those that are diseased, the malady will extend from the latter to the former, especially if these have been deprived of soil by washing, or are moist. This finds its explanation in the fact that the disease-affected potatoes under these circumstances produce spores freely and an external vegetative growth of spawn threads (mycelia) that pass from potato to potato.

Conditions Affecting Phytophthora.

It is the experience of other countries that there occur at intervals seasons during which the Phytophthora disease asserts its presence with especial virulence and wide occurrence; and, on the other hand, ones during which it appears to be in almost complete subjugation. Endeavour has been made to define the character of these, and to prove that they are characterised by special meteorological conditions; but there is little consensus, in the opinions that are pronounced, with regard to this matter. Excessive humidity and precipitation with sudden changes of temperature, and the reverse conditions, are usually invoked to account for these attenuated and virulent outbreaks respectively.

It is usual to assume that warm and even hot conditions are favourable to the growth and development of fungus-parasites such as *Phytophthora infestans*. This is, however, in many cases an erroneous one. Thus it has been experimentally shown that the temperature conducive to the freest development to this potato parasite—or optimum temperature for *P. infestans*—is as low as 68 degrees Fahr., and that this ceases at 86 degrees Fahr. on the one hand, and at 44 degrees Fahr. about on the other. It has also been discovered that when subject to dry conditions, such as are often realised here, the conidia or spores, thick-walled though they be, readily perish, and they are not formed at all in a dry atmosphere or in one poor in oxygen. It has also been discovered that the vegetative portion of the fungus, even when contained within the tuber, succumbs when these are exposed to a temperature of 104 degrees Fahr. for three or four hours.

These relations between temperature and *Phytophthora infestans* encourage the belief that the disease will have a circumscribed range of occurrence in Queensland, and will, perhaps, also not greatly affect the summer crop.

It is now known that when the conidia or spores are placed in water, they produce their swarm spores for from four to six hours, commencing to do so after the first hour or two; and, that these will have come to rest, and have penetrated the leaf in from twenty to twenty-eight hours from the commencement of the experiment; and that it takes five or six days before a second generation of spores is produced. Accordingly, when a leaf spot exhibits the grayish white powder surrounding it on the under-leaf surface this time has elapsed since the infection its presence indicates.

If the air continues dry the spots may remain small and produce no spores at all for many days, but will do so in a few hours if the leaves are subjected to air saturated with aqueous vapour. This remark especially applies to the tomato, and explains the sudden extension of the disease when wet weather comes on in fields of both plants.

With regard to the traverse of the parasite within the tuber itself, there are grounds for concluding that the temperature, if high, but within the limits favoured by it, already mentioned, promotes its rapidity. Hecke, a German investigator, has, however, shown that, although the destruction of the tuber when once attacked is favoured by humidity, this is inimical to the growth of the Phytophthora fungus within it, that is hindered by the other organisms that thrive under these circumstances. And the writer has found that it is actually killed when subjected to the influence of the products of decay in a confined space.

A Danish investigator, Jensen, has stated that the spores (conidia) do not penetrate the soil more than 10 centimetres (4 in.), apparently referring to that which is compact and quite devoid of fissures. He, therefore, recommends earthing up the tubers well to protect them from spores, late shed by the affected-foliage. It has, however, been found in practice that this diminishes the yield.

With regard to the susceptibility of different varieties of potatoes it is found that generally speaking there is little difference, and that those that are credited with being immune from attack do not long maintain this character. It has, however, been found—at the Potato-culture Experiment Station in Germany—there is a relation between starch content and the incidence of disease, those containing most starch experiencing less damage.

PREVENTIVE MEASURES.

1. To any section of the State or district thereof in which potato culture is pursued, and in which the disease does not already occur, no potatoes should be conveyed that have emanated from any other place in which it does, much less should potatoes—presumably tainted, as ones having such an origin would be—be used for seed purposes. "It is madness to use, as seed, tubers which have been procured from a district known to have severely suffered from the disease in the last season." (E. J. Butler, Cryptogamist Botanist to the Government of India.)

2. Should the portion of the State be one in which the disease has occurred, the same obligation with regard to the origin of seed should be observed as far as is practicable, and if this cannot be done the seed, after first being found to be free from disease (*vid.* 3 and 4), should be subjected for two hours to a temperature of 40 degrees C. (104 degrees Fahr.), acting on the advice of Delacroix, in favouring this method of Jensen, and who states, that the buds are not injured by the treatment.

3. In the latter event also preference should be given to potatoes that require to be cut, rather than to small tubers to which this process would not be applied, and all those that exhibit any decay whatever, either active or otherwise, should be discarded. Then they should be examined in the

light of the description of symptoms already set forth (page 2), both before and after they have been cut into sets, and any found to manifest evidence of disease-presence be discarded. Scraping with the finger-nail and so disclosing the discoloured inner surface will often lead to the detection of Phytophthora if present, when otherwise it would be overlooked. Should none of these be noticeable, but should the ring—the light line shown on section running a short distance within the margin—be brown—even pale-brown—instead of white, a symptom of Brown Rot or of Dry Rot, the potato should equally be discarded.

4. Should in the course of the inspection of the seed, disease-affected potatoes be detected, it may be safely presumed that many more occur in which the most careful scrutiny will fail to bring infection to light; and it may be deemed a ground for rejecting the whole.

5. Disease in the tuber being constituted by the presence of "spawn" or "fungus threads" buried within the tissue of the tubers, it is obvious that no chemical wash to which these may be subjected will destroy it, although it may possibly succumb to Jensen's method of heating. [*Vid.* 2.]

6. Should from any circumstance (*vid.* "Establishment and Dissemination," page 4) the disease become manifest in any new district, all delay should be avoided and the "tops" at once destroyed. This is best accomplished by spraying them with a 5 per cent. solution of sulphate of iron, sulphuric acid being added at the rate of ·88 fl. oz. per gallon (equal 1 per cent.) should the sulphate of iron be oxidised to any extent. The potatoes—if any—should then be at once dug and disinfected in the usual way with formalin and, if at all visibly disease-affected, burnt.

7. In replanting in a district in which the disease has already occurred in the past season, as great an interval of time as possible should be observed between the removal of the preceding crop and this act. All should, as far as practicable, plant about the same time. It would be preferable, however, to cease potato-growing locally for a season, and then commence afresh, using clean seed potatoes.

8. The plot of land in which a diseased crop has occurred in the immediately past season should not be used for the succeeding potato field. If, however, this be unavoidable, care should be taken that no refuse connected with the previous crop be present, and, wherever practicable, a dressing of lime should be applied.

9. In all other countries in which the *Phytophthora infestans* occurs it became perennial after its first introduction, and to avoid the damage due to its onslaught the plants have to be sprayed with a special preparation. Notwithstanding the disease—as has been already seen—may not appear, or if so be little prevalent, during any particular season, still this spraying is persisted in as a protective measure against its visitation, it not being possible to foretell whether it will put in any appearance or not; and, when procedure is delayed until the earliest symptoms of its presence are revealed, so rapidly may it be propagated that the time for dealing with it will have already gone by in most cases, for the treatment has little or no influence on infection that has already taken place.

To demonstrate that year in and year out this spraying produces results that are profitable to the potato-grower, experiments have been prosecuted throughout a course of years—ten or more continuously—in England, the United States, Germany, and elsewhere.

As has been seen, infection is brought about by the seed or spore of the *Phytophthora infestans* germinating upon the potato leaf, and the particular spray-material resorted to has reference to the fact that certain mineral salts prevent, if present, this germination. Thus Dr. Wuthrich

has found that, in the case of blue stone (copper sulphate), 1 part in 10,000 of water stops swarm-spore formation, and 1 part in 1,000 similarly stops their sprouting.

10. Copper sulphate (blue stone) is therefore used as the essential of the spray-fluid—Bordeaux mixture—that is employed.

As this "has proved extremely successful" in New Zealand, where much destruction has been wrought by *Phytophthora infestans,* one is justified in quoting from the report of its eminent biologist—T. W. Kirk—the words that he uses in describing its manufacture:—

"Bordeaux Mixture.—Sulphate of copper, 4 lb.; fresh lime, 4 lb.; water, 40 gallons. Dissolve the copper in, say, 5 gallons of water in a wooden vessel: the best way is to tie it in a loosely woven bag, and suspend the bag from a stick across the tub, or, if in a hurry, use hot water. Slake the lime in another vessel, and add it to the copper solution; stir well till thoroughly mixed, then add sufficient water to bring the whole up to 40 gallons. Now strain out any dirt. The addition of 3 lb. of treacle (molasses) makes the mixture more adhesive, and should be used if damp weather is feared." [*Note.*—In practice it is found convenient to have two 40-gallon casks, one of which is cut across the middle to make two vessels—one for the lime water, and the other for the blue-stone solution—and to mix these two fluids together in the cask that is intact, straining everything through a piece of bagging attached to a frame on its entering therein. The Bordeaux mixture should also be tested in order that when prepared no unaltered blue stone remains in it to injure foliage. It is "tested" by dropping into it a few drops of a solution of yellow prussiate of potash (potassium ferro-cyanide 10 per cent.). If more lime is required the "test" solution turns reddish-brown as soon as it comes in contact with the mixture. In such case more milk of lime is strained in until the brown colour ceases to appear. Then a little more milk of lime is added to ensure an adequate amount being present.—H. T.] "Apply (Mr. Kirk continues) with a proper spray pump with a cyclone or Bordeaux nozzle, first when the potatoes are between 6 in. and 9 in. high, and twice later at intervals of about ten days. Two sprayings are often sufficient, the second being given when the plants are in flower; but in bad seasons three are desirable. The under surface of the leaves should be specially sprayed, for it is there that the fungus is chiefly developed." [*Note.*—The germination of the *Phytophthora infestans* zoo-spore or spore takes place on the upper surface, and penetration of the leaf by the germ-tube is effected there also.—H. T.] "Repeat if necessary. . . . If there be reason to suspect the presence of insects, 4 oz. of Paris green may be made into a paste and stirred into the mixture. In the case of the second and third sprayings, and of crops already grown, where the foliage is toughened, the 6, 4, 40 formula (*i.e.,* 6 lb. blue stone, 4 lb. lime, and 40 gallons water) may be used with advantage. Should rain fall within three or four hours after spraying, it will, of course, be necessary to repeat the dressing as soon as possible. . . . It is very important to spray all potato crops which do not appear to have yet contracted the disease. Such spraying should be looked upon as an insurance policy. *Caution.*—See *that the blue stone is pure, and the lime quick lime, spray at once*" [on making the Bordeaux mixture.—H. T.], "*using not less than 75 gallons of mixture per acre. . . . If good fresh lime cannot be got, use 5 lb. of washing soda instead of 4 lb. of lime.*" [This makes what is styled soda Bordeaux or Burgundy mixture. It—it may be remarked—loses its power of adherence in twenty-four to forty-eight hours after it has been made, especially should the temperature be high (Gastine). It should, therefore, never be used unless freshly prepared.—H. T.]

11. To Prevent Infection of Tubers.—When a plot of potatoes is attacked, Delacroix, already referred to, recommends that shortly before harvesting the crop the tops be cut, heaped up, and burnt. For, he adds, at the end of two or three days the conidia (spores) will be all dead, and cannot reach the tubers. Instead of cutting them, and in so doing necessarily disturbing the spores all round, the writer recommends killing them and the parasite at the same time with sulphate of iron. (*Vid.* 6.)

The question as to whether it will be expedient to leave the tubers in the soil after the tops have already succumbed to the disease, pending the destruction of the spores by the dry atmosphere, will depend on circumstances. Should rain come on, or the soil be already moist, the tubers will in this event, where they have been suffered to remain, succumb to the disease, infection being brought about not only by spores and zoo-spores derived from the plant above ground, but by spawn-threads passing from tuber to tuber through the soil separating them.

The earthing-up process has already been referred to as a measure directed towards the preservation of the tubers in the ground from disease already affecting the tops.

12. To prevent the spread of the disease amongst the tubers that have been dug out:—It is usual to proclaim against the common procedure of covering potatoes as a protection from the sun with potato-haulms when disease has visited the crop. Certain experiments that have been carried out in Germany, however, suggest—what would appear improbable—that tuber infection is very little effected by this action.

"Great care (writes T. W. Kirk) should be exercised, when picking the potatoes, to place on one side and burn all those that show the slightest sign of the disease, for if diseased tubers are stored with healthy ones they will become rotten and useless."

When a potato has once become discoloured only through the action of the disease, no conditions usually realised in potato-storing will prevent its decay. Nor will dipping it in formalin solution or sprinkling it with lime hinder this—rather the reverse.

13. In order to ensure the fullest benefit from the spraying operation it is essential that it cover the entire leaf-surface, and that it remain adherent to it. Whenever the Bordeaux mixture be present thereon, the fact will be denoted by the occurrence of a bluish-green film. A single fungus spore being competent to produce a leaf-spot, and this in the course of a few days to give rise to myriads of other spores, and such leaf-spot being liable to develop on any part of the foliage—the younger and more tender leaves especially—not only will renewed spraying be required after rainfall generally, but also for application to those leaves that have arisen in course of ordinary growth since the last spraying operation was completed. Except with a lavish expenditure of material, and then only with little perfection, can the application be made without the use of a properly manufactured spray pump.

Many kinds of these appliances have been devised for this work; but under Queensland conditions, where small areas only are devoted to potato-growing, the Knapsack spray pump will be found in every way suitable. Under different circumstances other pumps of larger capacity and force may be more economically employed, attached to vehicles drawn through the fields by horse power, and having each several delivery tubes and nozzles, the pumping as well as the control of these being effected by ordinary labour, or the motive power to work the pump being derived from the wheels by special gearing, and the nozzles adjusted to the height and distance apart of the rows of potato plants. It has, however, been found in practice that the ordinary Knapsack pump does the best work.

The larger machines, of which there are several models, may be used by handy men contracting to undertake the work of spraying for more than one farmer.

14. The Bordeaux mixture (and the same remark applies to the soda Bordeaux), if properly made, is not injurious to the potato plant in any way. Not only so, it is claimed for it that it improves the tuber itself, endowing it with a larger amount of starch than is possessed by unsprayed potatoes, even when these are not visited by *Phytophthora infestans.* Thus it has been asserted of its application that the cost of this is met by the improvement of crop. At any rate, where the disease is endemic the outlay for spraying must be regarded as a necessary addition to the cost of cultural operations that has to be incurred.

15. Spray pumps are obtainable from Messrs. Smellie and Co., Edward street, Brisbane; and from Messrs. Perry Bros., Queen street, Brisbane. They should be made of copper, and the valves—that are liable to perish when of rubber—should be metal valves, unless—if not of metal—several spare ones can be supplied. The former firm stock an excellent Knapsack spray pump named "Gould" that costs £4: the latter, the well-known "Figaro" that costs £2 15s. and does not possess the metal valves of the former; other pumps can be supplied by either of them. Sulphate of copper (bluestone) is procurable from Messrs. Taylor and Colledge, Charlotte street, Brisbane; Elliott Bros., Eagle street, Brisbane; and Thomason, Chater, Limited, William street, Brisbane. The price varies from 30s. to 32s. per cwt. In ordering this chemical it should be stipulated that it be iron-free and wholly soluble in ammonia. Sulphuric acid supplied by the first two of the foregoing firms costs from 2½d. to 3d. per lb.

16. In conclusion, farmers will do well on observing disease in their potato crops to notify the Department of Agriculture at once, and accompany by specimens whatever intimation they may make, to illustrate their statements. In this first instance of an outbreak of *Phytophthora infestans* disease in Queensland, scores of farmers have suffered loss through its visitation. Only two of them and one farmers' association, however, deemed it worth their while to bring the occurrence under notice; and then not until their crop was entirely ruined. Under these circumstances, its permanent presence in the State may be predicted with some confidence.

Note.—Horse-power Sprayers, and Potato Sprayers worked from a cart, are stocked by Langwill Bros. and Davies, 1 Queen street, Melbourne.

OTHER POTATO DISEASES.

Other affections may be confounded with *Phytophthora infestans,* and in certain instances Nos. 1 and 5 may coexist with it, *e.g.*—

1. Black Spot of Foliage (*Alternaria solani,* and *Macrosporium solani*). Markings darker coloured, better defined with raised waved lines. May destroy entire foliage of a crop. Tubers not directly affected.

2. Brown Rot, Tryon's Potato Disease, Bacteriosis. Sudden wilting of foliage. Brown discolouration along line of vessels (the "ring") on section of tuber with issue of droplets of gum. Ultimate speedy decay.

3. Dry Rot (*Fusarium spp.*). Foliage wilting and discolouration of "ring" as initial symptom also. No decay of tuber, or, if so, rarely.

4. Brown patches isolated within tubers (physiological).

5. Rhizoctonia disease. Stems with small tubers, young shoots from tubers "ring-barked": Skin of potato brown, cracked, and dead. Small black raised bodies on surface on wetting it. Tubers mummified and cracking on storing.

12-7-09. H. T.

General Notes.

COTTON IN THE WEST INDIES.

By all accounts, the cotton crop in Barbados will not be a great success this year, and in Jamaica the cultivation of cotton appears to be viewed with disfavour for various reasons. In the West Indian Islands, the Sea Island cotton has been almost exclusively grown, and now we find a Barbadian planter stating that a much more hardy plant is required, and one which will give a much larger return per acre than the Sea Island variety, even if it produced a less fine staple. "A cotton," he says, "that will give 800 or 1,000 lb. of seed cotton, selling at a few pence, will pay us better than the finest Sea Island." The Jamaican planters appear to think the same, and, as a matter of fact, a late communication from the British Cotton Growing Association also suggests to West Indians the substitution of a more robust grower than Sea Island cotton.

Experience has shown that in Queensland the growers of Uplands cotton made more money than the few who tried Sea Island; but the planters in this State are fortunate in having had the best Upland seed procurable, imported by the Department of Agriculture. The produce from this seed has frequently reached 1,500 lb. per acre of seed cotton, and the general average yield in Queensland may be set down at 1,000 lb. per acre.

HOW TO DRESS AN ANGORA GOAT SKIN.

Mr. W. L. Black, of Texas, U.S.A., in his excellent work on "Raising the Angora Goat and Mohair for Profit," gives the following formula for dressing the Angora goat skin:—

First.—The skin should be "fleshed." If it has been dried, it should be thoroughly soaked over night in cold water, and then placed on a half-round beam, and scraped with a blunt knife to remove fleshy particles, and open the pores of the skin, to receive the preparation for tanning.

Second.—The next thing is to wash the hair of the skin with lukewarm water and good soap, and, in rinsing, if the water is poured on the hair properly, it will have a tendency to get it straight. Where a good clean creek is convenient, it can be rinsed better in that than in any other way.

Third.—The skin is now ready to receive the dressing preparation, which is made of two-thirds powdered alum and one-third fine salt, well mixed together, and sprinkled over the fleshy part of the skin. See that the skin is covered to the thickness of a halfpenny. The skin is then folded up, flesh to flesh, and put away until the following day; when,

Fourth, it is opened up and sprinkled with a solution of alum and salt and water in like proportions as the first. This is done with a whisp broom, to ensure that the preparation will cover every part of the hide. A little bran may be sprinkled over the skin at this stage to absorb the solution and keep it damp. The skin is folded up as before, and the same thing is done for a couple of days more, when it is hung up to dry. It will be drawn or contracted, through the action of the alum, to about two-thirds its natural size, when perfectly dry, which will require several days.

Fifth.—After being dried, it has the appearance of a dried salted hide, very stiff, and all out of shape. It is then sprinkled with a little water to soften it. Do not make it too soft; just sprinkle it well, fold it up, and lay

aside for twenty-four hours, with a heavy weight on it; the water will soon penetrate the hide, and it will then be in condition for "mooning," which is the stretching process.

Sixth.—The stretching, or working, is done with a half-moon-shaped knife, with a short crutch handle to hold it; and the workman secures the skin by means of a beam like a tall, carpenter's horse. This can be made out of 2 by 2 stuff, and it is fixed to the floor of the room under a string joist of the floor above. A piece of 2 by 2 stuff can be used to fasten the skin securely for "working." If you have no regular half-moon knife, one can be made out of an old saw-blade, or something thicker and stiffer would be better, with a half-round blade, not too sharp. The skin is held firmly with one hand, and the workman has the half-moon fixed to the crutch-like handle, which he works from his shoulder. The crutch handle is placed under the armpit, and he holds the knife by his hand, and stretches the skin little by little, commencing usually at the outer end, and stretching it all round as nearly uniformly as possible. The skin should be worked in this way several time before it can be brought thoroughly back to its natural shape. After each working, it should be folded up, and a heavy weight placed on it, to keep in the moisture. It should be worked in this way several times, when the skin will be quite soft and dry. It must not be worked at all unless there is sufficient dampness in the skin to admit of its stretching. If it is perfectly dry when you attempt to "moon" it, it will split and crack.

Seventh.—There should be as little combing of the hair as possible. If the hair is matted, separate it by teasing it apart, and then place it on the working beam, and, with a rounded stick or broom-handle, beat the hairs straight.

COCOANUT DESICCATING IN AUSTRALIA.

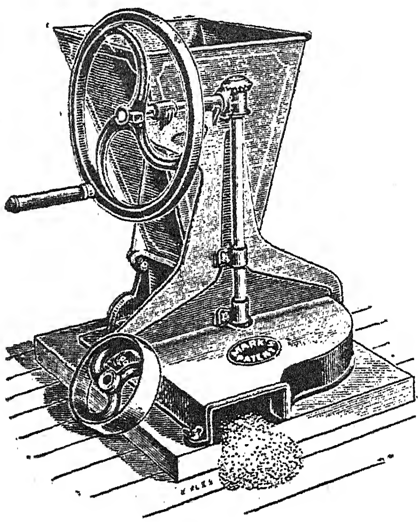
As a result of a successful experiment made with a small trial parcel of Ceylon cocoanuts at the Parramatta Desiccating Mills in Australia, a shipment of 10,000 nuts went forward early this week consigned to that factory. This is probably the first shipment of the kind that has been made to Australia; certainly nothing for actual commercial purposes has been shipped thither up to the present date. [Chamber of Commerce Price Current gives 5,000 nuts shipped to 3rd May.—Ed. "C.O."] This opening up of a new market for the Ceylon nuts will undoubtedly prove of considerable interest to all local cultivators of this product, and, while the exports continue to increase and fresh centres are established for the consumption of this particular article, prices must naturally be expected to advance in proportion. Statistics indicate that the total exports of desiccated cocoanuts are steadily on the increase, and any newer fields in the world's markets, where a demand is once created and consequently led to expand, will tend to stimulate the local industry to an appreciable extent. With regard to the latest enterprise in Australia, it is expected that the Ceylon nut, once its better quality is recognised, will gradually oust the article now imported there from the closer Dutch territories and such of the South Pacific Islands as now cultivate cocoanuts. There is at the present moment only one desiccating factory in Australia, but its establishment can only be regarded as the most practical indication that the demand is growing, and that there is a sufficient justification for the outlay of a large initial capital in hte requisite machinery. If this can be said of the Australian colonies, it is only to be expected that the Unted Kingdom, in addition to Germany, France, Belgium, and Holland, as well as America, will in time realise the economy of importing the raw nut and carrying out the desiccating process by themselves instead of, as at present, importing the manufactured article and leaving rather a large margin of profit, consumed in percentages according to value, to middlemen. While on this subject it is interesting to note that the fine, medium, and coarse grades are by far the most in demand,

and the fancy grades known as flake and strip (or thread) are seldom stocked in quantities by local millers. This is doubtless due to the fact that the former grades are better adapted to the manufacture of the various and unique forms of confectionery now produced. There should be no fear that the demand would in time exceed the supply if the industry is carefully watched locally and the cultivation extended in proportion to the increasing demand. It must be remembered that the local consumption alone is very considerable, and when the aggregate exports are reckoned there is every reason to hope that local cultivators will encourage the industry to the fullest possible extent. —"Ceylon Tropical Agriculturist."

A NOVEL CHAFFCUTTER.

What is said to be the only drop feet chaff or root cutter in the world is here depicted. The "Scientific Australian" says of this machine:—

"Chaffcutting would seem to be a more dangerous business than the layman would suppose. There have been numberless limbs sacrificed by the chaffcutter, and very little has been done to prevent these serious accidents recurring. Granted that it is only the careless man whose hand is caught, some protective means are required to save the careless, and at last this seems to be accomplished. Messrs. Marks Bros., of 60-2 Clarendon street, South Melbourne, have introduced a combined chaff and root cutter, in which it would



be impossible for these accidents to happen. This machine differs in many ways from the ordinary chaffcutter, the blades revolve horizontally to the ground, while the hopper is in a vertical position. In cutting chaff the sheaves or hay are just dropped into the hopper, when the rollers engage it and pass it to the blades, and, as it is impossible for the mouth to choke, no pushing with the hands is required. By disengaging a small handle the cutter will slice roots, such as mangolds, turnips, potatoes, chicory, apples, and even pumpkins, to any thickness from that of paper upwards. The blades are well protected by a table-like covering, and may be easily approached for sharpening. It only requires one man to feed and cut with this machine, or it can be worked by horse, steam, or other power."

[Drop feed root cutters are certainly no rarity in the market.—Ed. "Q.A.J."]

SAFEGUARDING WOOD AGAINST WHITE ANTS.

The American Consul of Managua forwards to his Government an article from a daily newspaper of Bluefields, explaining a new process for safeguarding timber against the ravages of the white ant. The article reads:—

"A new process has been discovered for warring against white ants, the pest of the tropics. These termites, as they are called, destroy the woodwork of the finest building within six months. Their action is insidious, inasmuch as the outward appearance of the wood does not betray the rottenness within, and their ravages, if not discovered in time, lead to the total collapse of buildings. No wood, except eucalyptus and teak, resists the termites. If soft wood is used in tropical countries, it must be saturated with kerosene.

"After a somewhat practical trial, news has been received from the Madras Presidency that the specimens sent there have successfully resisted the attacks of white ants. The great importance of this new process to India, Australia, South Africa, and other tropical regions can scarcely be over-estimated.

"The process is extremely simple and adds very little to the cost of the timber. To those who are technically interested in the new process, it may be explained that it is one which rapidly seasons newly cut timber, and unlike other systems improves, toughens, and strengthens the wood, enhancing the appearance and resisting the attacks of dry rot which in temperate countries is the equivalent of termites. This is accomplished by boiling the timber in a saccharine solution, which extracts the air and coagulates the albumen in the sap. In cooling, the air spaces are filled with saccharine matter which in large measure is analogous to the fibre of timber. The timber is then rapidly dried in fairly high temperatures and becomes a homogeneous vegetable substance which does not expand, warp, contract, or split like ordinary timber.

"A revolution in the export timber trade to tropical countries is likely to ensue. In tropical regions where termites abound, soft wood will now replace the more expensive hard woods. The cost of building permanent railways, bridges, piers, &c., will be greatly reduced and the anxieties attending the inroads of the white ant will be eliminated."—"Indian Trade Journal."

LANCASHIRE COTTON INDUSTRY.

UNPROFITABLE BUSINESS.

For more than a year the cotton industry has been depressed (says a writer in the "Times" Financial and Commercial Supplement), and there seems to be no prospect of an immediate revival in the demand for cotton piece goods and yarn. The production is large, larger than at any previous period in the history of spinning and weaving; for the extraordinary "boom," which began at the end of 1904 and lasted practically three years, led to a great expansion of spindles and looms. Joint stock companies were formed to erect mills to the extent, in round figures, of 10,000,000 spindles, and a large proportion of these are now working and producing yarn. The increased output at first was absorbed by a heavy export demand, and by extensions in the weaving branch. There are, however, 4,000,000 spindles now in course of erection, and these are gradually bringing yarn upon the market. In 1903 we had in this country 44,000,000 spindles; to-day the figure may be put down at 54,000,000. The weaving looms extensions during the last few years amount to about 120,000 looms; in 1903 the total number was 647,000 looms, and to-day there are 760,000. This brief summary will give some idea of the expansion which has recently taken place in the Lancashire cotton trade.

A NEW USE FOR THE LOCUST BEAN.

The "Indian Trade Journal," 22nd April, says:—

"It is stated that calico printers and finishers have recently devoted some attention to the locust bean for use as a thickening agent. For this purpose the seeds in the bean itself are split and boiled with water for five or six hours, the insoluble matter being then removed by straining. About 4 oz. of split seed per gallon of water give a fairly thick colour, and as it leaves the cloth very soft after printing it is especially suitable for extract styles where only a slight soaping in the open soaper is possible. The mucilage much resembles that from gum tragacanth in appearance, but there are marked differences between the two as regards the action on them of various chemicals. In addition to its suitability for many classes of finishes and printing colours, the locust-bean mucilage has the merit of cheapness; in fact, as the beans can be purchased for 95s. per ton, the mucilage itself is the most economical thickening there is. Gum tragasol, which has been on the market for some time, is manufactured from locust beans by a special process, and is said to be in growing demand as a substitute for gum tragacanth."

[The Locust Bean (*Ceratonia siliqua*) is known by the various vernacular names of "Carob," "Algaroba," "St. John's Bread," &c. It is used in chocolate-making and in the manufacture of liquorice. The pods vary in size up to 10 in. long, 1 in. wide, and ⅓ in. thick. It will thrive wherever the orange can grow without protection in winter.—Ed. "Q.A.J."]

TO DESTROY MOUND ANTS.

In the evening, when all the ants are in the nests, pour a large tablespoonful of bisulphide of carbon down half a dozen of the main openings. Then throw a wet bag over the nest, and let it remain for two or three minutes. Take off the bag and apply a lighted match fastened to the end of a stick to each treated opening, when the ascending fumes will ignite and explode, shattering the nest and killing the ants within it. By this means not only are the ants killed, but the nest is destroyed. No danger need be feared in igniting the fumes in the nest, but care must be taken, when placing the bisulphide in the nest, not to have a light about, as the chemical is very inflammable.

RATS AND OWLS.

In some of our sugar districts rats are a source of great loss to planters, although the losses do not amount to the large sum stated by a Jamaica journal to be the annual loss to the island from the depredations of rats—viz., £100,000; and the journal adds:—

"There should be a world-wide campaign against rats, for the keynote of success in our battle against them must be co-operation. Co-operation should begin at home, and our efforts in Jamaica instead of being spasmodic should be unanimous and persistent.

"If all cats were good ratters they would be the best means of getting rid of rats, but it is the exception for a cat to be a ratter at all. A well-fed cat is very seldom a ratter. Outside of the house the best ratter is undoubtedly the owl, and we go so far as to say that these birds should be encouraged, and that a planter, if he has none around, should get a pair. As many as twenty freshly killed rats have been found about a single owl's nest where there were young ones. The number of rats and mice that one pair of owls will kill in a year must be enormous."

CASTOR OIL PLANT FOR GREEN MANURE.

From analyses made of the castor plant, the total weight of crop per acre (1,210 plants) was found to be 6,655 lb. containing 2,323 lb. of organic matter (34·91 per cent.) or humus-forming material. The nitrogen added to the soil by a crop of castor would thus be 33·3 lb. per acre, while at the same time it furnishes 21·3 lb. phosphoric acid (anhydrous) and 53·2 lb. potash.

COTTON AND OTHER FIBRES.

From the report of the work of the Imperial Institute for 1906-7, we take the following items of interest to cotton and sisal growers:—

A sample of long-stapled cotton grown at Deesa, Bombay, was examined. The cotton was rather rough, but of good quality and somewhat similar to an American Upland cotton.

A sample from the Singbhum district of Bengal was of very satisfactory quality and worth about 6d. per lb., with "fine" machine-ginned Broach at $5\frac{9}{16}$d. per lb.

Six samples of long-stapled cotton from Burma and Bengal were examined and found to be of promising quality and about equal in value to "middling" American cotton.

Three samples of Caravonica cotton from Madras were of excellent quality, and were valued at from 12d. to 14d. per lb., with "good" Abbassi at $14\frac{7}{8}$d. per lb.

Seven samples of cotton from Poona, Bombay, were examined and found to be of poor quality; they were valued at from 3d. to $4\frac{1}{2}$d. per lb., with "middling" American at 7·16d. per lb.

Forty additional samples of cotton, sixteen samples of cotton-soil, and a large number of herbarium specimens were added to the reference collection.

A specimen of *Agave rigida* fibre (sisal hemp) from India was of excellent length and colour and of fair strength, and was regarded as worth about £36 to £38 per ton. A sample of this fibre from British East Africa was valued at the current price of Mexican sisal (£34 to £35 per ton). A specimen of the fibre of *Agave americana* from India was of promising quality, but somewhat imperfectly cleaned, and was valued at £27 to £28 per ton.

THE WORLD'S COTTON CROP RETURNS, FROM JONES'S HANDBOOK.

(IN THOUSANDS OF BALES).

Season.	America.	India.	Egypt.	† Brazil, &c.	Total.
1902-3	10,758	4,183	758	2,804	17,913
1903-4	10,124	4,471	797	2,760	18,152
1904-5	13,557	4,061	843	2,172	20,633
1905-6	11,320	4,797	798	2,542	19,457
1906-7	13,550	5,195	926	2,443	22,114
1907-8	11,582	4,303	965	2,867	19,717

† Including all other countries.

EXPORT OF GRAPES AND PEACHES TO LONDON.

In our last issue we published an article on the above subject, which, by inadventure, was not acknowledged as having been taken from "The Fruit World of Australasia," to the proprietors of which journal our apologies are due.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1908.							1909.					
	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.
North.													
Bowen	0·45	0·88	0·51	0·96	2·47	0·42	0·42	15·48	4·52	1·06	1·15	2·32	1·98
Cairns	0 59	3·70	2·12	0·74	3·07	1·60	1·41	32·05	5·25	21·03	14 19	1·06	2·48
Geraldton	2·64	8·11	3·66	2·81	6·93	3·80	1·69	47·92	10·29	37·31	28·51	5·98	9·13
Gindie State Farm ...	...	0·40	1·27	...	...	...	...	...	..	...	...	...	...
Herberton ..	0·31	2·36	Nil	0·51	1·27	0·61	0·78	12·41	2·28	3·52	0·70	0·81	1·22
Hughenden .	0·05	0·68	Nil	Nil	1·67	1·94	1·05	7·55	1·55	2·86	...	Nil	1·71
Kamerunga State Nurs.	0·76	4·85	1·58	...	3·64	1·69	...	...	3·52	...	4·95	0·97	...
Mackay	1·29	1·65	0·71	2·27	1·80	2·57	0·02	15·00	1·36	9·00	2·59	2·33	2·05
Rockhampton	0·10	1·08	0·84	0·20	2·14	2·47	1·37	9·01	2·01	1·68	1·21	0·3	1·33
Townsville	Nil	1·70	0·27	0·28	1·58	1·26	0·07	6·94	1·70	7·01	1·28	1·07	1·51
South.													
Biggenden State Farm	0·43	0·49	2·33	1·39	1·80	2·12	3·66	7·37	2·68	2·45	2·00	0·72	2·60
Brisbane	0·17	0·77	2·83	0·67	1·77	2·25	1·28	1·99	2·72	2·65	4·67	0·82	1·75
Bundaberg	0·39	0·75	1·56	1·10	2·39	0·73	3·34	6·52	3·70	5·06	1·54	0·67	1·51
Dalby	0·63	0·14	1·80	1·13	2·55	3·65	1·56	1·46	3·55	0·99	1·60	Nil	1·87
Esk	0·23	0·46	2·75	2·16	1·29	5·99	3·62	2·64	3·21	3·27	5·03	0·36	2·43
Gatton Agric. College	0·16	0·6	2·71	1·84	1·93	5·71	1·29	1·94	5·00	3·18	3·82	0·32	...
Gympie	0·38	1·16	2·87	1·37	2·49	2·58	3·97	3·86	3·77	3·41	2·34	1·15	2·96
Ipswich	0·12	0·47	3·23	1·19	1·48	5·09	1·05	1·37	1·95	2·66	4·56	0·5	1·31
Maryborough	0·46	0·81	1·98	1·05	1·84	1·92	1·64	8·36	7·11	2·28	2·44	0·91	2·57
Roma	0·55	0·63	1·38	1·12	2·15	2·79	1·68	5·19	4·85	4·18	1·91	0·44	2·73
Roma State Farm ...	...	1·27	0·73	...	...	...	...	...	...	...	...	...	...
Tewantin	0·75	1·97	2·70	2·18	2·30	7·50	4·12	6·44	3·31	4·34	9·3	1·00	3·24
Warwick	0·80	1·24	2·99	1·96	0·96	5·28	2·02	0·87	0·82	1·30	2·21	0·70	1·23
Westbrook State Farm	...	0·49	1·97	...	...	2·05	...	...	2·61	1·43	...	...	...
Yandina	0·58	2·64	2·18	1·50	3·10	6·03	2·75	6·69	6·42	3·71	5·25	1·10	2·70

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND,
Divisional Officer.

Answers to Correspondents.

INDIAN CHUTNEE.

PICKLES, Bowen—

The "Encyclopoedia of India" gives the following recipe for making mango chutnee:—

Take of green mangoes, raisins, mustard seed, salt, green ginger, and garlic, one seer ($2\frac{1}{7}$ lb.) of each; onions (none, or, if used), half a seer (say 1 lb.); dried red chillies, a half to one seer (1 lb. to $2\frac{1}{7}$ lb.); moist sugar, one to two seers ($2\frac{1}{7}$ lb. to $4\frac{1}{3}$ lb.); white wine vinegar, 4 bottles. The ginger, garlic, and onions are to be peeled, and, together with the chillies, are to be cut into thin slices previously to being pounded; the mustard seed is to be washed and dried, then gently bruised and winnowed; the raisins to be washed and freed from the stones; the sugar to be made into a thick syrup; the mangoes to have the rind removed, cut into thin slices (some boil them in three bottles of the vinegar, adding the fourth when mixing them up with the other ingredients) and pounded; the remaining articles are to be separately pounded; then the whole is to be incorporated, put into a stone jar, well closed, and *placed in the sun for a month or two.* If put into a glass bottle, it should occasionally be put out in the sun. It will keep good for years.

WEIGHT OF LIME.

E. P., Terror's Creek—

A bushel of lime weighs between 60 and 70 lb.

Times of Sunrise and Sunset at Brisbane, 1909.

DATE.	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·16	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·31	5·0	6·39	5·4	6·30	5·19
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·32	5·0	6·39	5·4	6·29	5·20
5	6·15	5·13	6·32	5·0	6·39	5·5	6·28	5·20
6	6·16	5·13	6·33	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·6	6·26	5·21
8	6·17	5·11	6·33	4·59	6·39	5·6	6·26	5·22
9	6·18	5·10	6·34	4·59	6·39	5·7	6·25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·35	4·59	6·39	5·7	6·23	5·23
12	6·19	5·8	6·35	4·59	6·38	5·8	6·22	5·24
13	6·20	5·8	6·35	4·59	6·38	5·8	6·22	5·24
14	6·20	5·7	6·36	4·59	6·38	5·9	6·21	5·25
15	6·21	5·7	6·36	5·0	6·38	5·9	6·20	5·25
16	6·22	5·6	6·37	5·0	6·37	5·10	6·19	5·26
17	6·22	5·6	6·37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·5	6·37	5·0	6·37	5·11	6·17	5·27
19	6·23	5·5	6·37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6·37	5·0	6·36	5·12	6·15	5·28
21	6·25	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·25	5·3	6·38	5·0	6·36	5·13	6·13	5·29
23	6·26	5·3	6·38	5·1	6·35	5·13	6·12	5·30
24	6·26	5·3	6·38	5·1	6·35	5·14	6·11	5·31
25	6·27	5·2	6·39	5·1	6·34	5·14	6·10	5·31
26	6·27	5·2	6·39	5·1	6·34	5·15	6·9	5·31
27	6·28	5·2	6·39	5·2	6·33	5·15	6·8	5·32
28	6·28	5·1	6·39	5·2	6·33	5·16	6·7	5·32
29	6·29	5·1	6·39	5·2	6·32	5·16	6·6	5·32
30	6·29	5·1	6·39	5·3	6·32	5·17	6·5	5·33
31	6·30	5·0	....	...	6·31	5·17	6·4	5·33

PHASES OF THE MOON.

			H. M.
5 May	○	Full Moon	10 8 p.m.
13 „	☽	Last Quarter	7 45 a.m.
19 „	●	New Moon	11 42 p.m.
27 „	☾	First Quarter	11 28 a.m.
4 June	○	Full Moon	11 25 a.m.
11 „	☽	Last Quarter	0 43 p.m.
18 „	●	New Moon	9 28 a.m.
26 „	☾	First Quarter	4 43 „
3 July	○	Full Moon	10 17 p.m.
10 „	☽	Last Quarter	4 58 „
17 „	●	New Moon	8 45 „
25 „	☾	First Quarter	9 45 „
2 Aug.	○	Full Moon	7 14 a.m.
8 „	☽	Last Quarter	10 10 p.m.
16 „	●	New Moon	9 55 a.m.
24 „	☾	First Quarter	1 55 p.m.
31 „	○	Full Moon	3 8 „

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	JULY. Prices.
Apples (Hobart), per case	8s. to 9s.
Apples (Victorian), per case	5s. to 8s.
Apples (Local), per case	3s. 6d. to 5s.
Apples (Cooking), per case	4s. to 6s.
Bananas (Cavendish), per dozen	1½d. to 2½d.
Bananas (Sugar), per dozen	1¼d. to 2½d.
Cape Gooseberries, per quarter-case	5s. to 7s. 6d.
Custard Apples, per quarter-case	1s. to 2s.
Lemons, per case	4s. to 5s. 6d.
Lemons (Sydney), per case	..
Mandarins, per case	2s. to 4s. 6s.
Oranges, per case	1s. 6d. to 3s.
Oranges (Local), per case	...
Papaw Apples, per quarter-case	1s. to 2s.
Passion Fruit, per quarter-case	1s. 6d. to 2s. 6d.
Pears, per case	...
Pears (Hobart), per quarter-case	...
Pears (Victorian), per quarter-case	...
Persimmons	...
Pineapples, Ripley Queen, per dozen	4s. to 5s.
Pineapples, Rough, per dozen	1s. to 2s. 9d.
Pineapples, Queen, per dozen	3s. to 6s.
Rosellas, per sugar bag	...
Strawberries, per tray	1s. 9d. to 2s. 6d.
Tomatoes, per quarter-case	10d. to 1s. 6d

SOUTHERN FRUIT MARKET.

Apples (Hobart), per case	6s. to 7s.
Apples (Victorian), per case	5s. to 6s.
Apples (Local), per case	4s. to 7s.
Apples (Cooking), per case	3s. to 4s.
Bananas (Queensland), per bunch	1s. 6d. to 3s. 6d.
Bananas (Queensland), per case	8s. to 8s. 6d.
Cocoanuts, per dozen	1s. 6d. to 2s. 6d.
Lemons (Local), per gin case	6s. to 7s.
Lemons (Italian), per half-case	12s. to 13s. 6d.
Mandarins (Local), Emperors, per gin case	4s to 5s.
Mandarins (Medium), per half-case	2s. to 2s. 6d
Oranges (Choice), per case	5s. to 6s.
Oranges (Navel), per case	7s. to 7s. 6d.
Passion Fruit (Choice), per half-case	3s. to 3s. 6d.
Peanuts, per lb.	5d.
Pears (Choice), per bushel	3s. 6d. to 10s.
Pears (Medium), per bushel	5s. to 6s.
Persimmons, per box	3s. 6d. to 4s.
Pineapples (Queensland), Ripley Queen, per case	9s. to 10s.
Pineapples (Queensland), Choice, Queens, per case	9s. to 10s.
Pineapples (Queensland), Choice Common, per case	9s. to 10s.
Quinces, per gin case	2s to 3s.
Rock Melons, per dozen	...
Strawberries (Queensland), per 3-quart tray	1s. 6d. to 3s. 6d.
Tomatoes (Queensland), per quarter-case	1s. 6d. to 3s. 6d

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JULY.

Article.		JULY. Prices.
Bacon, Pineapple	lb.	7½d. to 9d.
Barley, Malting	„	...
Bran	ton	£5
Butter, Factory	lb.	1s. 2d.
Chaff, Mixed	ton	£5 10s.
Chaff, Oaten	„	£4 15s. to £5 5s.
Chaff, Lucerne	„	£5 10s. to £7 10s.
Chaff, Wheaten (Straw)	„	£3 10s. to £4
Cheese	lb.	8d. to 8½d.
Flour	ton	£12 10s.
Hay, Oaten	„	£5 10s. to £6.
Hay, Lucerne	„	£5 to £5 15s.
Honey	lb.	2¾d. to 3d.
Maize	bush.	4s. to 4s. 1d.
Oats	„	3s. to 3s. 3d.
Pollard	ton	£5
Potatoes	„	£6 to £7
Potatoes, Sweet	„	£2 to £3 3s.
Pumpkins	„	...
Wheat, Milling	bush.	5s. 6d.
Wheat, Chick	„	5s. 4d.
Onions	ton	£8 to £8 10s.
Hams	lb.	11d. to 1s.
Eggs	doz.	1s. 1d. to 1s. 4½d.
Fowls	pair	2s. 9d. to 4s. 6d.
Geese	„	6s. 6d. to 7s.
Ducks, English	„	4s. to 4s. 10d.
Ducks, Muscovy	„	4s. 6d. to 5s. 6d.
Turkeys (Hens)	„	7s. to 8s.
Turkeys (Gobblers)	„	12s. 6d. to 19s.

ENOGGERA SALEYARDS.

Animal.	JUNE. Prices.
Bullocks	£8 10s. to £9 10s.
„ (single)	£10 10s.
Cows	£6 5s. to £7.
Merino Wethers	19s. 6d.
Crossbred Wethers	17s. 6d.
Merino Ewes	14s.
Crossbred Ewes	18s. 9d.
Lambs	14s. 3d.

Orchard Notes for September.

By ALBERT H. BENSON, M.R.A.C.

The Southern Coast Districts.

The marketing of citrus fruits in the later districts, of the late winter or early spring crop of pines and bananas, also of strawberries and Cape gooseberries, will continue to occupy the attention of fruit-growers. I can only repeat the advice I have so often given in these notes respecting the marketing of all kinds of fruit—viz., to grade the fruit evenly, pack honestly, and display it to the best advantage if you want to get good returns.

September is a very important month to the fruit-grower; owing to the fact that it is usually a dry month, and that it is essential in all cases to keep the land in a high state of tilth, so as to retain the moisture that is required by the various trees that are in blossom, thus securing a good set of fruit. Where irrigation is available, it is advisable to give the trees a good watering should the ground be dry, as this will induce a good growth and cause the fruit to set well. If an irrigation is given, it should be a thorough one, not a mere surface watering, and once the land is saturated the moisture must be retained in the soil by constant and systematic cultivation. If this is done, one good watering will usually be enough to carry the trees through in good condition to the thunderstorms that come later or over to the summer rains, if the soil is of a deep sandy loamy nature.

No weeds must be allowed in the orchard or vineyard at this time of the year, as they are robbing the trees and plants of both the water and plant food that are so essential to them at this period of their growth.

There is not much to be done in the way of fighting scale insects during the month, as they are more effectually dealt with later on; but where young trees are showing signs of distress, owing to the presence of scale insects, they should be treated, the gas method being the most efficacious.

Beetles and other leaf-eating insects often make their appearance during the month. The best remedy is to spray the trees or plants with one or other of the arsenical washes that are recommended by me in this Journal. The vineyard will require considerable attention. Not only must it be kept well worked, but any vines that are subject to the attack of black spot must be sprayed from time to time with Bordeaux mixture. Disbudding must be carefully carried out, as this work is equally as important as the winter pruning, as it is the best means of controling the future shape of the vine. A very common fault with vines grown in the coast districts is that the buds often remain dormant, only the terminal bud and possibly one other starting into growth, thus leaving a long bare space on the main rods, which is undesirable. When this takes place, pinch back those shoots that have started, and which are taking the whole of the sap, and force the sap into the dormant buds, thus starting them into growth. This will result in an even growth of wood all over the vine, not a huge cane in one part and either a stunted growth or dormant buds on the rest.

Every care should be taken during the month to prevent the fruit fly from getting an early start. All infested oranges, loquats, kumquats, or other fruits should be gathered and destroyed, as the keeping in check of the early spring

crop of flies, when there are only comparatively few to deal with, will materially lessen the subsequent crops. Land that is to be planted with pines or bananas should be got ready now, though the planting need not be done till October, November, or even later. Prepare the land thoroughly; don't scratch the surface to the depth of a few inches, but plough as deeply as you have good surface soil, and break up the subsoil as deeply as you can possibly get power to do it. You will find that the extra money expended will be a profitable investment, as it will pay every time.

TROPICAL COAST DISTRICTS.

September is usually a very dry month, and fruit trees of all kinds suffer in consequence. The spring crop of citrus fruits should be harvested by the end of the month, as if allowed to hang later there is a great risk of loss by fly. The fruit should be well sweated, and if carefully selected, well-graded, and well-packed it should carry well to and fetch high prices in the Southern States, as there are no oranges or mandarins grown in Australia that can excel the flavour of the best of the Bowen, Cardwell, Cairns, Port Douglas, or Cooktown fruit.

As soon as the fruit is gathered the trees should be pruned and sprayed with the lime and sulphur wash, as this wash is not only a good insecticide, but it will keep down the growth of all lichens, mosses, &c., to which the trees are very subject.

Every care should be taken to keep down the crop of fruit fly during the month. All infested fruit should be gathered and destroyed, particularly that in or adjacent to banana plantations. Watch the banana gardens carefully, and keep well cultivated. New land should be got ready for planting, and where land is ready planting can take place.

Papaws and granadillas are in good condition now, and if carefully gathered and well packed in cases only holding one layer of fruit, they should carry well to the Southern markets if sent in the cool chamber.

SOUTHERN AND CENTRAL TABLELANDS.

Prune grape vines at Stanthorpe the early part of month, leaving the pruning as late as possible, as the object is to keep the vines back in order to escape damage from late spring frosts. All vines subject to the attack of black spot should be treated with the winter dressing when the buds are swelling, this treatment to be followed by spraying with Bordeaux mixture later on.

Where fruit trees have not received their winter spraying, they should be treated at once before they come out into flower or young growth. Where the orchard or vineyard has not beeen ploughed, do so, taking care to work the land down fine as soon as it is ploughed, so as to keep the moisture in the soil, as the spring is always the trying time for fruit trees.

Look out for fruit fly in the late oranges and loquats in the Toowoomba district. Keep the orchards and vineyards well cultivated; disbud the vines when sufficiently advanced, spray for codling moth.

In the Central tablelands irrigate vines and fruit trees, and follow the irrigations with deep, constant, and systematic cultivation. Keep down all weed growth; and fight the red scale on citrus trees with cyanide. The objective of the fruit-grower throughout Queensland during September and the two following months is, "How best to keep the moisture in the soil that is required by the trees, vines, plants, and vegetables," and this objective can only be obtained by irrigation where same is available, or by deep, systematic, and constant cultivation where there is no water available for irrigation.

Farm and Garden Notes for September.

FIELD.—Spring has now arrived, and with it there will be the usual trouble with weeds, especially on carelessly cultivated, uncleaned ground. Therefore, the cultivator, the horse and hand hoe *must* be kept vigorously at work to check the weed pests, save the growing crops, and much future labour; attend to earthing up any crops which may require it. There may possibly occur drying winds and dry weather; still, good showers may be looked for in October, and much useful work may be done during the present month, which will afford a fair prospect of a good return for labour.

Plant out *Agave rigida*, var. *sisalana* (sisal hemp plant) in rows 8 ft. by 8 ft. or 6 ft. by 8 ft. apart, according to the richness of the soil. All dry places on the farm, too rocky or poor for ordinary crops, should be planted with this valuable aloe; especially should limestone country be selected for the purpose. If the soil is very poor and the plants very small, it is better to put the latter out into a nursery of good soil, about 1 ft. to 18 in. apart. Next year they will be good-sized plants. Keep down tall weeds in the plantation, and do not allow couch grass to grow round the roots. The sisal will do no good if planted in low, wet land, or on a purely sandy soil. It thrives best where there is plenty of lime, potash, and phosphoric acid, all of which can be cheaply supplied if wanting in the soil. Sow cotton, Sea Island near the coast and Uplands generally. Sow maize, sorghum, imphee, mazzagua, prairie grass, panicum, tobacco, and pumpkins. Sugar-cane planting should be vigorously carried on. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, ginger, and canaigre, the latter a bulb yielding a valuable tanning substance. Plant out coffee.

KITCHEN GARDEN.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing most kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost; dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and stir the soil in the latter case early next day to prevent caking. Mulching with straw or leaves or litter will be of great benefit as the season gets hotter. It is a good thing to apply a little salt to newly-dug beds. It is not exactly known what the action of salt is on the soil, but when it is applied as a top-dressing it tends to check rank growth. A little is excellent for cabbages, but too much renders the soil sterile, and causes hard-pan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow cucumbers, melons, marrows, and squashes at once. If they are troubled by the beetle, spray with Paris Green or London Purple. In cool districts peas, and even some beetroot, may be sown. Set out egg-plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, eschalots, cabbage, radishes, kohl rabi, &c. These will all prove satisfactory provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

FLOWER GARDEN.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur, notwithstanding the increasing temperature. Keep a good lookout for slugs. Plant out chrysanthemums, palms, and all kinds of tropical and semi-tropical plants. If hot weather should ensue after planting, water and shade must be given. Sow dianthus, snap-dragon, coleus. Roses will now be in full bloom. Keep them free from aphis and cut off all spent blooms. This latter work should be done in the case of all flowers. If you wish to save seeds, do not wait for the very last blooms, but allow some of the very best to go to seed. If you have any toads in the garden or bushhouse, encourage them to take up their abode there. They are perfectly harmless in spite of their ugliness, and they destroy an astonishing number of insects injurious to plants. Fill up all vacancies with herbaceous plants. Sow zinnia, gailliardia, amaranthus, cockscomb, balsam, sunflower, marigold, cosmos, summer chrysanthemum, coreopsis, portulacca, mesembryanthemum, calendula, &c.

Agriculture.

RICE GROWING.

We have lately had several inquiries from farmers concerning the possibilities of rice-growing in Queensland. Most of our correspondents are possessed with the idea that rice can only be grown in tropical swamps, under conditions which could not lead to the establishment of the production of this cereal in a community of European farmers. This is a too common error. Many portions of this State are eminently adapted to rice culture, and very paying returns have been received, especially in the Southern coast districts, by those who have cultivated what is generally known as mountain rice. The swamp rice of Japan, Java, and other tropical countries, has never been attempted in Queensland, and would, certainly, prove a disastrous speculation to any one who tried it. The following exhaustive article on the cultivation of this cereal was written in 1901, by Mr. F. W. Peek, of Loganholme, at a time when rice was largely grown at Pimpama, at Cairns, and in some other localities. There is no more trouble in growing rice than in growing wheat. Swamps and irrigation canals are not needed. The land can be ploughed and prepared as for wheat, and the crop harvested in the same manner. We reprint Mr. Peek's paper, in the hope that rice-growing may once more figure in the settled industries of the State:—

RICE-GROWING IN THE LOGAN DISTRICT, AND ITS PREPARATION FOR MARKET.

By FRED. WM. PEEK, Loganholme.

INTRODUCTION AND EARLY CULTIVATION.

In writing up this article (by special request), I will endeavour to make the information contained as intelligible as possible to the ordinary farmer and agriculturist. Of the value of rice there can be no two expressions of opinion, as this cereal forms the chief food supply of over one-half of the entire human race, and certainly there is not another product or cereal that, commercially or economically, obtains the same value as rice.

The varieties of rice to be obtained from the various countries where rice forms one of the staple crops for food supply, are innumerable, running into several hundred varieties, particularly where it is grown largely, as in India, China, Japan, Siam, West Indies, and in other parts of the world, and it has been found that local names have been given to rice of the same variety and quality. For general purposes and distinction, rice has been classified into three distinct varieties or classes. These are known to us as the "Aus," or upland rice; the "Aman," or swamp rice; and the "Boro," another swamp rice, or a variety requiring inundation, warm climate, and rapid growth, and producing a large coarse grain, but which, so far as I have been able to ascertain, has not been tried or cultivated in Queensland up to the present. The portion of the Logan district where rice is now being extensively cultivated is known as Pimpama Island, which is situated in the south-eastern portion of the State, in 153 degrees east longitude and between 27 and 28 degrees south latitude, and is approached from Brisbane by means of the South Coast Railway as far as Beenleigh, thence by well-formed roads for a distance of twelve miles crossing the Albert River and skirting round the base of Mount Stapylton or what is known locally as Yellowwood Mountain, which presents to the visitor's gaze

one of the prettiest views in the Logan district, dotted from base to summit with its settlers' homes and splendidly laid out farms. The dark-green patches of sugar-cane, bananas, maize, and other crops, strongly contrasting with the rich red volcanic soil visible here and there, make a picture of agricultural industry both pleasing and effective, and one of which the district is justly proud.

What is known as "Pimpama Island" is the land lying between the Logan, Albert, and Pimpama Rivers, which are connected by a series of creeks and swamps with a long frontage to the Pacific Ocean or Moreton Bay, containing several thousand acres of rich coastal land, interspersed with large areas of ti-tree swamps, the water of which is brackish and undrinkable. The soil cultivated, and which has proved itself best adapted to the growth of rice, is of a sandy, loamy nature in appearance, but containing in a remarkable degree the constituents most suited to the nature and requirements of the plant, being easy of working, although slightly tenacious in wet or showery weather, but of very shallow depth in some places. Layers of decomposed marine shells are found in rather large quantities, pointing out that the lands were once ocean-washed, and the receding waters have left valuable deposits of lime and other constituents in the soil, which, together with the rich humus formed by the decaying foliage of scrub vines, palms, ferns, &c., of rank tropical growth, have left these patches of soil of varying area between the swamps most suitable for rice culture.

The value of the land averages from £2 10s. to £6 per acre without improvement, and very little, if any, remains unalienated, it being so close to Brisbane, and the Logan district being one of the first settled districts of the colony. All the best lands were early availed of for cultivation. Who first introduced the rice seed of commercial value to Queensland appears to be undecided; but our State Botanist, Mr. F. M. Bailey, has described a species of wild rice (*Oryza sativa*), a native plant of North Queensland, growing in the swampy lands there, as being indigenous to this State; also, the Chinese have grown rice rather extensively on the North Queensland river banks, particularly near Cairns, in patches for many years past, and which has met with a ready sale when placed on the market.

But it is to Mr. A. J. Boyd, the present editor of the "Queensland Agricultural Journal," that the credit is due of the introduction, in 1869, of rice-growing in the Logan district—he having procured the seed and planted it as an experimental crop at his sugar plantation, Ormeau, which he then had at Pimpama. The seed was one of the Japan varieties, with which he met fair success as regards the growth and result. Since that time, from the seed Mr. Boyd raised and distributed, other settlers have taken up the matter of rice-growing at various times and in a fitful manner, the largest local planter some fifteen years ago being Claus Lahrs, an enterprising German settler, who planted at Pimpama Island two or three varieties of the China and Japan rices, but, owing to the seed not being tested or acclimatised, he met with but indifferent success. He even went so far as to incur the expense of erecting a mill for dressing the paddy (as rice in husk is termed), but after a few years he gave it up, partly because of the machinery, not being of the best description for dressing the rice, doing its work imperfectly, but also because the rice grown was not the best variety for table use or suitable for the home market. So the industry, so far as the manufacture was concerned, was allowed to lapse. The farmers since then have still kept on planting the rice, which they have cut and used for fodder for their horses and stock, using the seed saved from the crop reaped for re-sowing the land. The consequence has naturally been that the crop had deteriorated with successive plantings, through the same seed being used without change. But three things of great importance had been learned. These were: 1st. The suitability of the

soil and climate of the Logan district for rice culture. 2nd. The proper time at which to sow the seed to ensure success. 3rd. The best system of planting and after-treatment of the crop. The value of rice has also been thoroughly tested as green feed for horses and stock, who eat it greedily and keep in splendid condition when fed upon it. The greatest difficulty in rice culture has been found in procuring the right seed, there being such a large variety of each kind, both with their distinctive flavour, colour, and quality, as well as in the facility with which the crop can be handled and harvested (as I will explain further on) and in the requirements of the merchant, who has his prejudices in favour of certain kinds, which more or less best suit the tastes of the consumer. This has now to a certain extent been overcome, and our farmers are now prepared to carry out this important branch of agricultural industry on sound business lines and with up-to-date methods.

PREPARING THE LAND.

Rice, like every other cereal and vegetable, to ensure good results, must have a certain amount of attention and care in preparing the land, although the question of drainage does not enter so largely into consideration as regards rice as with other cereals, and it, of course, greatly depends as to which variety of rice you intend to cultivate, but stagnant water should be avoided as detrimental. The variety I intend this article to illustrate is the Aus, or upland rice. I have tried the Aman variety as an experiment, but with small success, the chief fault of the latter being the necessity of it being submerged continuously with not less than 2 to 3 inches of water, and, when the crop ripens, the difficulty of harvesting, owing to the grain being so brittle that at the least touch it leaves the ear with a consequent loss of seed. The variety of rice now grown most extensively in the Logan district is known as the "White Java," which gives a length of straw from 4 to 6 ft., with a good flag, besides a grain of good length, fairly plump, and good cropper, and, so far, seems fairly free from disease or rust. Other varieties now being tried are the China, Kobe Japan, Batavia River, and Italian Upland, of which the White Java and the Italian Upland have been obtained through the medium of the Agricultural Department.

In preparing the land for planting, ordinary methods need only be adopted—that is, to first plough, leaving the soil to lay for a week or so, to aerate and sweeten; then crossplough and harrow, bringing the soil to as fine a tilth as possible. The best time in this district for planting (and I should think it a suitable time for all districts south of Rockhampton) is at the end of September or at the beginning of October, when we get the first rains. In cultivating for rice on hillsides or sloping land with a natural rapid drainage, it would be advantageous to slightly terrace the land crossways to the fall of the hill, leaving an open catchment drain on the higher side, blocked at each end to conserve the rain water, because even so-called upland rice must have a certain amount of moisture, and by the construction of the above drain, or dam so to speak, the gradual percolation of the conserved water will have the desired effect of helping to supply the necessary moisture, which would be about 20 to 30 in. of rainfall spread over the period of growth. This rainfall has produced very good crops of fair yielding grain.

SOWING THE SEED.

In sowing the seed we have to be determined as to our requirements—if for cropping for grain or for fodder purposes only. There are three systems: Broadcast chiefly for fodder purposes, planting in drills, and transplanting from nursery beds. In the first instance—*i.e.*, sowing broadcast—it will take a bushel (60 lb. of paddy) to the acre, the seed being harrowed and treated in the same manner as oats or wheat in the after cultivation. But the plan most

generally adopted, and by far the best, is planting the rice in drills 2 ft. 6 in. or 3 ft. apart, and about 10 to 12 in. between the plants, which may be done successfully with an automatic seeder. By this method, about 35 to 40 lb. seed to the acre are required. It ensures the crop being more even and not so patchy as when sown broadcast, and allows a better chance of going through the crop with hoe or cultivator to remove any weeds that may have made their appearance before the rice has got fairly started. The system of planting in nursery beds and transplanting out is adopted chiefly in planting swamp rice or the Aman variety; but, as this system of planting entails a lot of labour, I do not think it will ever come into active operation in this State. The mode of operations with this variety is briefly as follows:—Beds are prepared according to the area to be planted; a bed about 20 ft. long and 6 ft. wide will be amply large enough to grow plants for a quarter of an acre, the beds being well made and enriched, so as to produce vigorous plants. Sow the seed and rake in carefully, watering at certain intervals. Care must be taken to keep the plants growing. When the plants are about 6 in. high they are ready for transplanting to their permanent beds, which is done by making holes about 10 in. to 1 ft. apart in the rows and 2 ft. 6 in. between the rows. But, as before pointed out, this is a most tedious and costly mode of planting, and the labour involved is a serious item for consideration. You might as well try to transplant a field of oats or wheat, and expect to get a profit. So that it will be easily seen the planting in drills is at once the most economical and systematic, besides being the one most generally adopted.

HARVESTING THE CROP.

This was a difficult matter to undertake with the rice formerly planted in the Logan district, the China and some of the Japan varieties being so brittle that when ripe the least touch caused the grains to drop off with a consequent loss of seed. This has been happily overcome to a certain extent by the better variety planted. Not only does the White Java give better facility for harvesting, but the straw is of a better colour and quality, of a good length, averaging from 4 ft. to 5 ft., and in good land even 6 ft. is no unusual length; and no more fairer or gratifying sight to the farmer's eyes can be imagined than the rich appearance of a rice field ready for harvesting: this is whilst the stalks have still a bronze-green appearance, the heads have turned a golden brown, about half-way down, and appear what a wheat farmer or an inexperienced person would deem three-parts ripe. The heads of rice, heavy with grain, have a graceful, drooping appearance; as many as thirty to forty heads have been produced from a single grain planted—the product weighing from 10 oz. to 14 oz. By cutting some varieties of rice in this state, the loss is not so great as with over-ripe grain. The cutting is begun in the morning as soon as the dew is off, the rice being bound up into very small bundles, ready to be threshed as soon as possible (which will be explained later on). Rice is never left stooked in the field, but is treated as quickly as possible.

The usual method pursued in harvesting is to cut with the ordinary sickle or reaping-hook, although where large areas are now being planted it is thought that the latest inventions of wheat-harvesting machinery could be used most effectively. A slight alteration in the reaper and binder might be required in the way of lighter and broader wheels on the rich soft rice lands, but otherwise I see no difficulty in the harvesting. At all events, it is the intention of the writer to induce some firm to make a trial at next harvesting as an experiment, and if successful a machine will doubtless be obtained on co-operative lines for the use of the district. After cutting with the sickle, the rice is gathered into bundles and carted into the barn or shed, or, if not sufficiently dry, is left for a day or so to ripen; but this is not often the case, experience having taught our farmers the right time to cut, and it is generally taken to the barn at once for stripping or threshing.

THRESHING THE RICE.

Where there are large quantities, this can be done with the ordinary flail on a threshing-floor, but other systems are in vogue where only small quantities are grown. One plan of threshing is by driving four forks into the ground, about 4 or 5 ft. apart in width and 10 or 12 ft. long, placing two long saplings lengthways and two crossways. Over these a sheet or tarpaulin is placed to hang and form a sort of long trough. In the centre, resting on the cross pieces, a rough kind of ladder is placed, and the bundles of rice are then beaten over the bars of the ladder, which causes the grain to drop into the bag. Some farmers merely nail a few strips across a box or wooden trough, and beat the rice out on this by handfuls. After the grain is beaten from the straw (it is then known as paddy), the next operation is the winnowing. This is done in an ordinary sieve by letting the grain fall on to a sheet in a light breeze, the sieve being held up at a little distance; its weight causes the sound grain to fall on the sheet, whilst the light grain, bits of straw, &c., are wafted away to one side. The paddy is then carefully collected and placed in the sun, spread out for a few days to get thoroughly dry, when it is bagged and stowed away in a dry barn, or else taken away to the miller for turning into the article of trade and commerce with which we are more familiar, and known as rice and not paddy. The straw, after the grain is threshed out, is spread out to dry or cure, or else it is fed to the stock. A great deal of nutriment remains in the stalk at the time of threshing, and I believe it would make up into a splendid ensilage if desired to be used when other feed is scarce. I should be pleased to hear the results if any of our enterprising farmers will give it a trial.

MILLING THE RICE AND PREPARING THE CROP FOR MARKET.

This is a most interesting operation, and for the want of the necessary machinery the rice industry has lain dormant for several years in the Logan district. Every credit must be given to Mr. F. W. Peek (the writer of this article) for the energy and enthusiasm he has displayed in reorganising the industry, and the farmers, through the medium of the Logan Farming and Industrial Association, who took the matter up, believing that a great benefit would result to the district if only carried out in a systematic manner. The matter was ably discussed at their meetings. The Agricultural Department was written to for advice, and their assistance was given as far as possible to facilitate the objects sought to be obtained. It was from information supplied by the Department that the farmers were induced to co-operate in the purchase of a new and better variety of seed, a quantity of White Java—900 lb.—being purchased and distributed at first cost among the farmers; next, a small experimental patch was started, the Department supplying rice seed of other varieties, which are now being tested for their producing and milling qualities, the seeds from this source being again redistributed free of charge to those willing to grow them and still further test the various kinds submitted.

With the large increase of area planted, the want of a mill began to make itself felt. The prices offered for Queensland-grown rice were very low, principally owing to no local mills in Southern Queensland being established at that time. Again, the Department of Agriculture was appealed to, and the address was obtained of the latest up-to-date firm of manufacturers of rice-milling machinery. This was the Engleburg Huller Co., of Syracuse, U.S.A., who were promptly written to for information, and price-lists and catalogues were received from them. A meeting of the farmers was called, and an endeavour was made to get a co-operative mill, but without success, the general opinion being that growing and manufacture were two different branches of the business, and that milling would be better undertaken by a local sugar-miller, who would have the necessary engine power to work the rice-mill at

times when the sugar season was over. This was eventually the plan adopted. Mr. Wm. Heck, who owns a sugar-mill on Pimpama Island, sent for and erected the necessary buildings and machinery as an adjunct to the sugar-milling industry. A neat weatherboard structure, the dimensions being 28 ft. long, 18 ft. wide, and 22 ft. high (two story), was erected on stumps to keep the floors dry—an essential in ricemilling operations—a floor being placed about 10 ft. high from the basement floor and extending the full length of the building. Upon this floor is erected the Engleburg Huller and Polisher, a neat little machine known as the "No. 4 size," and capable of treating half-a-ton of dressed rice per day. The paddy, being run into the hopper of the machine, falls on to a cylinder which revolves at high speed and most effectually "hulls"—that is, rubs off the cuticle or outer skin—and polishes the grain in one operation. The pollard or residuum from the rice (hulling and polishing) falls on the floor, whilst the grain itself descends to the lower or basement story of the building by means of a shoot which conducts it into a machine placed to receive it, and known as a grader, which is worked and fed automatically from the machine above. There are four sieves or sifters in this grading machine which separate the broken grains, and also the polished rice into first, second, and third quality, the rice being caught in bags or boxes placed to receive it. It is then ordinarily ready for market, but Mr. Heck has added another machine to his mill, known as an improved winnowing machine; this machine, by a series of cogs and cranks, makes the rice pass through another set of sieves, and, at the same time, the wind from a rotary fan contained in the machine and driven at a high velocity clears off any impurities of husk, dust, &c., that may be with the rice after leaving the grading machine, and completes the milling operations by finishing the product in a perfectly clean and highly polished state. Samples of this rice were exhibited at the last National Agricultural Society's Show in Brisbane, and submitted to experts, who expressed themselves as pleased at the improved samples displayed, which were equal to any imported rice of the same variety and very little different from the best Japan.

THE RICE CROP—WILL IT PAY?

This is the question invariably put to the writer whenever advocating the growing of rice as one of the crops to be successfully undertaken in the coastal districts of this State.

In the first place, take the cropping. In ordinary situations, with only fair cultivation, from 30 to 40 bushels of 60 lb. of paddy can be obtained per acre, which is double the wheat yield, the average crop of wheat being from 15 to 20 bushels per acre. I know in some instances these quantities have been exceeded in both crops, but I give a fair average for comparison. The value of wheat per bushel ranges from 3s. to 3s. 6d., whilst the value of rice sold to the local mill averages from 4s. to 5s. per bushel delivered at the mills. Then dry rice chaff is of great value as a feed for stock and horses, and I feel sure, if placed on the market and once fairly tested, it would command a ready sale. The straw is less hard, and, when well dried, compares favourably with oaten straw, and a fairly low estimate would give (according to variety grown) from 3 to 4 tons per acre, of an estimated value of £2 to £3 per ton, or an average to the grower per acre of straw and grain of £15 10s. per six months' crop. Of course, in favoured districts two crops can be obtained in the year—that is, where frosts do not appear. Then the above figures would have to be doubled as a yearly income, but, in the Logan district, only one crop of rice is taken, to be followed by a late crop of some other kind, such as oats, &c. Of course, the greatest benefit is derived by the grower on a large scale if he does his own milling. A glance at the prices paid for paddy and the prices now obtainable for the finished product will be worth consideration. Taking the

current prices of rice, at the time of writing, in the Brisbane market, duty paid, best Japan is £24 per ton. The commonest quality of imported rice, "Rangoon," fetches, duty paid, £19. This price gives a fair margin of profit to the local miller if he sells at £18 per ton. The samples being milled this season at the Pimpama Island Mill are of very high grade, and closely resemble "Patna" in shape of grain, but slightly darker in colour. Taking then, the local rice at £18 per ton market value, to produce which 1 ton 10 cwt. of paddy would be required (according to records taken at recent trials) to be milled, of a value of £12 9s. 9d.; this would leave a margin of £5 10s. 3d. I will add here that paddy rice is bought locally like wheat at 2,240 lb. per ton, deducting the cost of milling, the average of about £2 per ton leaves the miller a net profit of £3 10s. 3d. per ton. To this must be added the value of the pollard, which also is of great value as feed for calves, pigs, or poultry, when steamed and then mixed with separator milk. Its commercial value is certainly not less than £2 to £3 per ton.

The following is taken from the Brisbane "Observer" of 29th June, 1901:—

"We were to-day shown a sample of rice grown at Pimpama Island, Moreton Bay. It resembles Patna rice in shape of grain, but is darker in colour. Qualified experts who have seen the sample say that it is the first really high-grade rice that they have seen grown in this State, and as it can be marketed at from £18 to £18 10s., should command a ready sale. The commonest quality of imported rice, Rangoon, fetches £19, duty paid, here just now, while for Japan rice £24, duty paid, is asked by the distributing houses."

The price quoted for the mill such as I have described, and which is so constructed that it can be duplicated or extended at a very small cost is, for the No. 4 machine, with a capacity of not less than half-a-ton per day, together with grader, &c., about £130, delivered at Brisbane. Of course, the buildings are extra, and the power required to drive the machinery; but worked in conjunction with any existing sugar-mill, or sawmill, &c., it would prove of great value to the district, and a source of profit on the outlay to any enterprising millowner.

FUTURE PROSPECTS OF THE RICE INDUSTRY.

Like all other crops, rice has its enemies and diseases; it has a kind of rust, smut, &c., and in some parts of Queensland grubs will take the roots, but up to the present the grub has not caused any trouble in the Logan district. The rust has yet to be dealt with, and I think this will be accomplished by experimenting with various kinds of rice seed till we meet with a rust-resisting variety. It is probable now, that under Federation the importance of rice culture will receive the attention it is worth. A large sum of money is annually expended in importing the product into the Commonwealth States, I would therefore advise all farmers to give rice a fair trial, especially as we are growing varieties that can now be classed as fairly successful on our coast lands, and where a fair average rainfall can be partly depended upon. The value of rice grown simply as fodder to cut green is great for stock feed, the stalks being sweet, juicy, and succulent, and giving a good return per acre, and all stock will eat it with avidity. The question of labour does not enter largely into rice cultivation; as I have pointed out, although a tropical product there is every facility for cultivation by present mechanical methods—that is as far as the Aus or upland rice is concerned; the Aman or Boro varieties being swamp rices needing irrigation I have not yet heard of as being grown to any great extent, and they probably will not be for some time, if at all, owing chiefly to the heavy outlay required for a suitable water supply and an irrigation plant, which can be dispensed with in growing the beforementioned varieties of upland rice, which have proved most suitable for existing conditions and our present agricultural methods of cultivation and harvesting.

Of this I am certain, that the rice is one of our coming crops which, together with coffee, will prove of great benefit to this State particularly, and a further source of wealth to our producers. The market for rice in Australia is a growing one, and it will take years before the supply overtakes the demand. Our farmers need not fear to grow the crop and invest in this industry, which will return a fair amount of profit for the labour and outlay required to produce an article which only requires care in selecting and planting the varieties to suit the market requirements. I am sure the efforts or our producers will be crowned with success, and I shall be pleased with the part I have taken in assisting the modern development of rice cultivation in Queensland.

REGISTRAR-GENERAL'S STATISTICS OF RICE PRODUCTION AND IMPORTATIONS FOR THE YEAR 1900.

Total area planted in Queensland ...	319 acres
" quantity produced (paddy ...	9,275 bushels
,, average would equal of clean rice	320,617 lb.
The net imports of rice for 1899 were ...	9,283,933 lb.
Of the value of	£50,099

The above figures represent the position as to production and consumption, and would therefore be about 3·34 per cent. of the total requirements of this State only.

[The total annual production of rice in the United States of America, which, in 1866, was 2,000,000 lb., has now reached 350,000,000 lb. It will take 8,000 large railway cars to handle the crop this season. Rice lands have risen from £2 per acre to £8 per acre; hundreds of miles of irrigation canals have been constructed. Rice has been the redemption of the prairie lands of Texas and Louisiana. In ten years the worthless lands of these two States will produce the world's demand in rice. An acre there produces 20 sacks, worth from 10s. to 16s. per sack. Where are the Queensland farmers in the race?—Ed. "Q.A.J."]

POTASH—A MANURE FOR ORCHARDS, VINEYARDS, AND GARDENS.

By ALBERT H. BENSON, M.R.A.C.

The value of potash as a manure for orchards, vineyards, and gardens is only now beginning to be recognised by our Queensland growers. It has been used in small quantities, generally in the form of a mixed fertiliser, for some years; but it is only recently that it is being used systematically.

The reason for this I will deal with later on, as, in the first place, I wish to show the important part that potash plays in the growing of fruits and vegetables. If one makes a careful study of the analyses of the ash of the principal commercial fruits and vegetables, one cannot fail to be impressed with the important fact, that potash forms a very large percentage of the ash; in fact, so much so, that it may be said to be the dominant ingredient of the ash. Potash is usually present in the largest proportions in the ash of fruits, roots, and pulses, but it is present also in large quantities in the ash of wood, leaves, and roots of fruit trees and vines, and in the roots and foliage of vegetables.

In the case of the ash of fruits, the average potash contents for all commercial fruits amount to nearly 50 per cent. of the total weight of the ash. Some fruits, notably stone fruits, run considerably higher, in some cases the potash amounting to 70 per cent. of the total ash.

This being the case, it seems at first sight an extraordinary fact, that so far we have used such a small quantity of potash as a manure; especially when we take into consideration the fact, that many of our soils are by no means rich in this essential plant food, particularly so in a readily available form.

How is it then, one may ask, that we have been able to grow such good crops of fruits and vegetables for years past without the application of potash manure; and why is it now necessary to apply such manures in order to keep up the yield of fruit or vegetables? The answer to those questions is, that the bulk of the land on which we are growing fruit is virgin land, and that this land has, up till the present, shown little signs of deficiency in available potash. In other words the available potash in new land, particularly when there has been a heavy growth of forest or scrub timber burnt off, has been sufficient to produce good returns, in some cases for several years, and it is only now that this available supply is becoming exhausted by the heavy crops of fruits or vegetables that have been taken off the land that we are beginning to find out the value of potash as a manure.

There is one very noticeable feature in manuring with potash, and that is, it is only when the supply of available potash in the soil is exhausted or seriously depleted that we see the beneficial effect of manuring with potash. This accounts for those cases when it has been found that the application of potash has had apparently no effect, as where there is a sufficiency of available potash in the soil for the proper development of the crop, the addition of an extra supply of potash has had no effect. In these cases the grower has been disappointed, and has even gone so far as to say that potash is no good as a manure. The fault has not been with the manure, but that the soil was already sufficiently rich in this plant food. The question now arises, how is the grower to tell when his land requires potash? This can only be answered by an analysis of the soil, or, better still, by a little experimenting on the part of the grower. A few pounds of sulphate of potash applied to a row of English or sweet potatoes, or to a patch of tomatoes, will soon show the grower if his land wants potash, as, if in want of this plant food, the results of the manure will be very evident.

The total amount of potash contained in a soil, as shown by analysis, is often very misleading, as it is only that portion which is soluble or readily available that can be utilised by the plant. The bulk of the potash in the soil is in an insoluble form that only becomes slowly available. This is clearly shown in the case of the soils in the Stanthorpe district. Here the bulk of the soils are formed by the disintegration of the granite rocks for countless years. The granite is rich in felspar that contains from 7 to 8 per cent. of potash, yet once the available potash in the soil is depleted, the addition of a potash manure to the soil has a very marked effect in the production of potatoes, tomatoes, carrots, pulses, and of all fruits.

Another instance of the necessity of having a sufficiency of available potash in the soil, is clearly shown by the analyses of some banana soils from the Liverpool Creek district, North Queensland. Two soils were selected, one on which bananas had been grown for some six years and then abandoned, and the other virgin soil about to be planted in bananas. The two soils were for all practical purposes identical, and a complete analysis showed very little difference between them in the toal amount of potash; but a second analysis, to determine the available potash, showed that the virgin soil contained five times as much as the land on which bananas had been grown and given up.

As a further instance of the necessity of having a sufficient quantity of available potash in the soil I can quote the experience of a large pineapple-grower on the North Coast Line. The soil on which the pines are growing is deep sandy loam, that was originally covered with a heavy growth of timber which was burnt off on the land.

For the first five years the pines made a good growth, and gave good returns without any manure. They then began to go back, and were manured with meatworks manure (phosphoric acid and nitrogen), and the results were still satisfactory for some time. Finally, they again showed signs of going back even though they received a greatly increased dressing of meatworks manure. The pines had depleted the supply of available potash, and, consequently, owing to the want of potash, the meatworks manure failed to act. This was clearly proved by the addition of potash to the land as the pines responded at once, and produced a heavy crop of excellent fruit. Previous applications of potash to this land had, apparently, no result; and it was only when the available potash was depleted that the addition of potash as a manure had such a marked effect.

When land is deficient in available potash as shown either by analysis or by the simple tests that I have recommended, the addition of potash as a manure for all kinds of fruits and vegetables will have a very marked effect, and is one of the best investments the grower can make. I am often confronted by the grower saying, but potash is such an expensive manure, it costs £14 or £16 a ton: true, yet a ton of high-grade sulphate of potash contains about 50 per cent. of pure potash, or, in other words, 100 lb. of sulphate of potash contains 50 lb. of pure potash, and, at the higher rate of £16 per ton, this works out at only 3½d. per lb., which is about the same price per lb. as one has to pay for phosphoric acid, and only about one-third of the price per lb. one has to pay for nitrogen.

Sulphate of potash is a concentrated manure, and is the cheapest form in which to buy potash, especially when the question of railway or steamer freight and cartage is to be considered.

Times of Sunrise and Sunset at Brisbane, 1909.

DATE.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·58	6·5	4·46	6·28
2	6·2	5·34	5·28	5·48	4·58	6 6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·35	5·26	5·49	4·56	6·7	4·46	6·30
5	5·59	5·35	5·25	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·24	5·49	4·55	6·9	4·46	6·32
7	5·57	5·36	5·22	5·50	4·54	6·9	4·46	6·32
8	5·55	5·37	5·21	5·50	4·54	6·10	4·46	6·33
9	5·54	5·37	5·20	5·51	4·53	6·11	4·46	6·34
10	5·53	5·38	5·19	5·52	4·52	6·12	4·46	6·34
11	5·52	5·38	5·18	5·52	4·52	6·12	4·46	6·35
12	5·51	5·39	5·17	5·53	4·51	6·13	4·47	6·36
13	5·50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·50	6·15	4·47	6·37
15	5·47	5·40	5·14	5·55	4·50	6·15	4·47	6·38
16	5·46	5·40	5·13	5·55	4·49	6·16	4·47	6·38
17	5·45	5·41	5·12	5·56	4·49	6·17	4·48	6·39
18	5·44	5·41	5·11	5·56	4·49	6·18	4·48	6·39
19	5·43	5·42	5·10	5·57	4·48	6·18	4·48	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·49	6·41
21	5·41	5·43	5·8	5·58	4·47	6 20	4·49	6·41
22	5·39	5·43	5·7	5·59	4·47	6·21	4·50	6·42
23	5·38	5·43	5·6	5·59	4·47	6·22	4·51	6·42
24	5·37	5·44	5·5	6·0	4·46	6·23	4·51	6·43
25	5·36	5·44	5·4	6·0	4·46	6·23	4·52	6·43
26	5·35	5·45	5·3	6·1	4·46	6·24	4·52	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·26	4·54	6·44
29	5·31	5·46	5·1	6·3	4·46	6·26	4·54	6·45
30	5·30	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

PHASES OF THE MOON.

			H. M.
7 Sept.	☽	Last Quarter	5 44 a.m.
15 ,,	●	New Moon	1 9 ,,
23 ,,	☾	First Quarter	4 31 ,,
29 ,,	○	Full Moon	11 5 p.m.
6 Oct.	☽	Last Quarter	4 44 p.m.
14 ,,	●	New Moon	6 13 ,,
22 ,,	☾	First Quarter	5 4 ,,
29 ,,	○	Full Moon	8 7 a.m
5 Nov.	☽	Last Quarter	7 38 a.m
13 ,,	●	New Moon	0 18 p.m.
21 ,,	☾	First Quarter	3 29 a.m.
27 ,,	○	Full Moon	6 52 p.m.
5 Dec.	☽	Last Quarter	2 12 a.m.
13 ,,	●	New Moon	5 59 ,,
20 ,,	☾	First Quarter	0 18 p.m.
27 ,,	○	Full Moon	7 30 a.m.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF JUNE, 1909.

Number.	Cow's Name.	Breed.	Date of Calving.	Total Milk.	Average Test. Per cent.	Commercial Butter.	Remarks.
				Lb.		Lb.	
1	Honeycombe	Shorthorn ...	11 April, 1909	936	4·1	42·93	
2	Linda ...	Ayrshire ...	11 April ,,	954	3·8	40·38	
3	Beauty ...	,, ...	11 April ,,	894	3·7	36·80	
4	Lubra ...	Jersey-Ayrshire	5 April ,,	632	4·6	32·70	
5	Nellie II. ...	Shorthorn ...	1 Mar. ,,	720	4·0	32·18	
7	College Lass	Ayrshire ...	31 Jan. ,,	743	3·8	31·45	
6	Butter ...	,, ...	20 Feb. ,,	706	3·9	30·73	
7	Rosepetal ...	Shorthorn ...	7 May ,,	729	3·7	30·11	
8	Rosalie ...	Ayrshire... ...	10 Feb. ,,	667	3·7	26·45	
9	Winnie ...	Shorthorn ...	4 June ,,	510	3·7	26·21	
10	Glen ...	,, ...	29 Jan. ,,	541	3·8	22·90	
11	Lady Ring	Guernsey ...	26 Jan. ,,	412	4·8	22·28	
12	Conceit ...	Ayrshire... ...	22 Dec., 1908	526	3·8	22·26	
13	Laura ...	,, ...	16 Nov. ,,	550	3·6	22·00	
14	Daisy ...	Holstein	24 Oct. ,,	560	3·4	21·37	
15	Whitefoot ...	Devon-Holstein	20 Oct. ,,	486	3·8	20·57	
16	Bangle ...	Shorthorn ...	23 Feb., 1909	434	4·0	19·35	
17	Comet ...	Holstein	22 Nov., 1908	476	3·6	19·04	
18	Dewdrop ...	,, ...	11 Nov. ,,	487	3·4	18·32	
19	Lydia ...	Ayrshire ...	23 Mar., 1909	464	3·5	17·99	
20	Ethel ...	Grade Holstein ..	3 Sept., 1908	431	3·6	17·24	
21	Poppy ...	Grade Guernsey	10 Jan., 1909	420	3·6	16·80	
22	Chocolate ...	Shorthorn ..	14 June ,,	408	3·7	16·79	
23	Rennet ...	Grade Holstein...	19 Mar. ,,	410	3·6	16·40	
24	Burton Whitefoot	Shorthorn ...	11 April ,,	395	3·7	16·25	
25	No. 112 ...	Grade Guernsey	24 Nov., 1908	350	4·1	16·05	
26	Mona ...	Grade Holstein...	20 Oct., 1907	392	3·8	15·96	
27	Lass ...	Ayrshire ...	14 June, 1909	345	4·0	15·41	
28	Friz ...	Grade Shorthorn	4 Feb. ,,	406	3·4	15·27	
29	Careless ...	Jersey	7 Dec., 1908	322	4·0	14·38	

Feed.—Natural pasture and chaffed sorghum, 30 lb. daily.

VINE CANES AS FODDER.

Few vignerons are aware of the value of vine prunings for winter feed for both cattle and horses. Vine canes, containing as they do stores of reserve material, such as starch and proteids to start the growth of the plant the following spring, constitute a fair fodder for stock. The food value is intermediate between that of straw and hay. The chief difficulty in connection with their use is the amount of preparation necessary in the way of chaffing and crushing. When hay is cheap this militates against their use, but in seasons of scarcity they become valuable, especially for use in conjunction with other fodders. In France they are largely used, special machines for treating them being obtainable. In certain French districts, nearly the whole of the vine prunings are utilised for fodder, especially in dry seasons. Sometimes the vines are pruned early, before all the leaves have fallen. The prunings, after chaffing and cutting, are made into ensilage, in which form they constitute a valuable fodder. They are also largely used in Switzerland and other European vinegrowing countries as manure, after having been conveniently chaffed.

The Horse.

HORSES.

BROKEN KNEES.

Broken knees in horses is a seasonable subject, and a few notes concerning it may be of service. The "rolling stone" may not "gather any moss," but it often gathers a tired horse to the ground, and with disastrous results to his knees (writes a veterinary surgeon).

Wounds of the knee are, of course, of all degrees of severity, depending on the nature of the fall and the condition of the road, and thus the popular term "broken knees" covers a wide range. It includes the "graze," that has no more serious consequences than a slight stiffness and a temporary loss of hair, or perhaps a slight blemish: the seriously bruised and lacerated skin; the penetration of sheaths of tendons; and, the worst injury of all, and the most difficult to deal with so far as treatment is concerned, the open joint.

Horses that have been "Down."

Broken knees have an importance beyond the blemish, which is generally accounted the major trouble, that is too often overlooked. Injuries of this kind are not accounted legal unsoundness after the wounds are healed, unless of such a nature as to interfere with the action of the joint; and it is just this into which it is important to inquire when purchasing an animal that shows evidence of having been "down." Only servants and wives throw horses down—when the owner is the driver they always fall; but any horse may stumble on a bad road in the hands of a careless coachman, and some there are that are habitual blunderers, or that suffer from some physical infirmity that renders it difficult to keep them on their legs. The risks attached to keeping animals of this class are so great—including as they do the chance of serious personal injury, as well as damage to horse, harness, and vehicle—that they are never cheap, and thus there should always be a careful inquiry into the antecedents of the horse that has been "down." Needless to say, the vendor's account of the blemish should always be distrusted and trial or independent testimony taken before purchase.

Treatment of Wounds.

The treatment of wounds of the front of the knee is, unless very severe, generally domestic, and, we may add, generally bad. There is invariably too much fussy interference and too much fomentation, if this term can be properly applied to the process as carried out in many stables. The measures to be adopted, of course, depend greatly on the nature and extent of the injury. The first step in every case is to cleanse the wound and remove all grit, dirt, and foreign matter generally.

This should be done by the method known as irrigation—that is, to take a soft, clean sponge and apply the water above the wound, so that the fluid trickles through it, and washes out the dirt invariably driven into the wound in the fall. This not only removes foreign matter, but tends to relieve the pain and stiffness, and enables us to definitely ascertain the extent of the injury. Having once thoroughly cleansed the wound,

Fomentation and Poulticing

are not, except in special cases, to be recommended, because heat and moisture induce soft, profuse granulations, which top the surface of the wound, and,

unless checked, make a bad repair and leave a "bumpy" knee. The chief thing is to render and keep the wound aseptic, and to this end the water used in cleansing the wound should have added to it some pure carbolic acid or any other antiseptic.

The Mildest Form of Injury

is simple abrasion, popularly called a "graze" or "scraze," with loss of hair. Here Nature would soon complete the cure, but we may assist by cleansing the wound by irrigating with a warm antiseptic solution, and painting the surface over with Friar's balsam, to exclude the air. This is generally to be obtained from the chemist's shop or stores, but in its absence a little French polish or solution of shellac in spirit answers just as well, since the balsam is only a solution of various gums in spirit of wine, which, in drying off, leaves a thin film covering the surface and affording it some protection. When the skin is badly bruised, but not cut, the animal should be kept quite quiet, and the head tied up short so that the horse cannot lie down. Movement should be discouraged, because the skin may be so injured that a little additional pressure would cause it to slough, and if there is sloughing of the skin there is as sure to be a permanent blemish as if the skin was cut away at the time of the accident.

Beyond the rest and preliminary bathing a little mildly astringent lotion, such as ¼ oz. of acetate of lead dissolved in a pint of rain-water, will suffice. When the skin is cut we have what is known technically as

A Lacerated Contused Wound,

which it is most important should be thoroughly cleansed from all dirt and foreign matter. Having done this, the hair should be carefully trimmed from the edges of the wound with a pair of sharp curved scissors, and the divided skin brought into apposition by means of strips of plaster. For a few days a simple lotion of carbolic acid, of about 1 in 60, should be applied, and this may subsequently be changed for one of chloride of zinc of a strength of one drachm in a pint of water. This keeps down profuse granulations, and ensures a good repair. Where "proud flesh," as it is popularly called, threatens to give trouble and cause a "bumpy" knee it is very useful to at intervals rub the granulations down with a large crystal of sulphate of copper (bluestone), or touch with a stick of nitrate of silver.

Several Cases of Injury,

such as exposure of the tendon and opening of its sheath, or laying open of the joint and exposure of the bones, with escape of synovia or "joint oil," are quite outside the pale of amateur veterinary surgery, and it is best to obtain professional aid without delay. It is generally advisable after an accident to give a dose of physic. This tends to keep down inflammatory symptoms and prevent constitutional disturbance. There is generally a demand for

"Something to Make the Hair Grow"—

in fact, most of the questions we get that relate to broken knees come at a stage when a permanent blemish is apparent. It is no more possible to make the hair grow on knees from which true skin has been cut or has sloughed, or the hair follicles have been destroyed, than it is to force a new crop of bristles on a worn-out body brush; but it is possible to stimulate the growth in cases where the hair follicles have not been seriously injured. Time and Nature will renew the growth under these circumstances, but we may assist in this, and at the same time do something to hide the temporary blemish by the application of diluted mercurial ointment, coloured to match the part.

For bays with black points, and dark-coloured horses generally, one part of strong mercurial ointment and two parts of lard or lanolin, with a sufficiency of lamp black, answers very well. Chestnuts require the addition of a minute quantity of Armenian bole to the above to give the required shade. Greys need only a touch of lamp black. Sometimes the hair on an injured knee comes white, rough, or curly, and then the usual plan is to shave the hair over the whole front of the knee and apply a cantharides blister.

One of the most efficient of modern remedies for removing the traces of broken knees, and of undoubted service in stimulating the hair bulbs, is a dressing prepared from the seeds of *Psoralea corylifolia*, which are well known as an Indian remedy for loss of hair. It is, however, idle to expect a serious injury to repair without blemish, since true skin once lost is never restored, and the material which fills the gap in a broken knee is not covered with skin as the surgeon understands it.—"Australian Field."

SOY BEANS.

The Soy Bean *(Glycine hispida)*, sometimes called the Soja bean, is a leguminous plant, and a native of South-eastern Asia. There are many varieties known in Japan, China, Thibet, and the temperate portions of the Himalayas. In the United States, the varieties known and grown are yellow, black, green, and brown soy, so named from the colour of their seeds, with, in addition, Etampes soy, which has seed like yellow soy, but grows to a height of over 2 ft., all the other varieties being only from 1 to 1½ ft. high. The soy bean requires about the same temperature as maize, and the "Journal of the Board of Agriculture" (England) thinks that, therefore, it may be grown in the south of England, and experiments are to be made with seed from Japan.

There is no question about the climate of Queensland being suitable for it.

According to the United States Farmers' Bulletins (Nos. 58 and 97), the methods of cultivation are similar to those required for ordinary field beans. It thrives best in soils of medium texture, well supplied with lime, potash, and phosphoric acid. Like other leguminous crops, it accumulates nitrogen in the nodules on its roots, and thus enriches the soil for the next crop. It endures drought well, and is not easily injured by excess of moisture.

The early varieties are best for seed crops, and the medium or late varieties for hay or forage. Seed may be planted at any time during the spring and early summer, but preferably as soon as the ground becomes thoroughly warmed. One-half to three-quarters of a bushel to the acre may be drilled, but about one-quarter of a bushel more if sown broadcast.

Little cultivation is needed when growing for forage, but, if grown for beans, weeds must be kept down. The crop should be cut for hay when in the late bloom or early podding stage; for ensilage, the crop can be cut later, but it is better to cut before the pods begin to ripen; for green forage, cutting may begin earlier, and continue rather later than for either hay or ensilage; the crop may be cut for for seed after the pods become about half ripe.

Owing to its coarse habit of growth, the soy bean is somewhat difficult to make into hay in moist climates, and the plant is liable to lose a large part of its leaves, but there can be no question as to its high feeding value when cut at the right season, and properly cured.

It is probably best used as green forage. The great variation in the season of maturity of the different varieties makes it possible to have a succession of forage throughout the greater part of the summer and autumn. It is stated to be excellent for dairy cattle, though stock do not always relish it at first. It has also been successfully made into ensilage in the United States.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND AND BRITISH NEW GUINEA.

BY F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order PAPAVERACEÆ.

SUBORDER FUMARIEÆ.

FUMARIA, Linn.

F. officinalis, *Linn.* Common Fumitory. A delicate glabrous annual of a pale-green colour, forming, when it commences flowering, a dense tuft of a few inches in height, but the stem will often grow out to the length of from 1 to 3 ft., it is then generally weak or trailing, and sometimes slightly climbing, supported by the twisted leaf-stalks. Leaves much divided into numerous segments, generally 3-lobed, the lobes varying in shape from narrow-linear to broadly lanceolate or oblong. Flowers in racemes of 1 to 2 in., either terminal or opposite, the leaves dense at first, but often lengthening much as the flowering advances. Pedicels short, in the axils of small scale-like white bracts. Petals oblong-linear, closed so as to form a tubular corolla, with dark-coloured tips, the spur at the base giving it the appearance of being attached laterally to the pedicel. Nut, usually about a line in diameter, not quite globular, being somewhat compressed laterally.—*Benth.*

Hab.: A native of Europe and Central Asia, some years ago it was rather a common garden weed in Brisbane gardens, and again this year has put in an appearance; I am indebted to Mr. Thos. Unwin for my last specimens.

Order CUCURBITACEÆ.

TRICHOSANTHES, Linn.

T. nervifolia, *Linn.* A large perennial. Stems somewhat woody below, flexible, thickened at the nodes, much branched; branches slender, striate, glabrous; tendrils bifid. Leaves 2½ to 3½ in. long, very broadly ovate-lanceolate, roundly-lobed at the base and sharply acute at the apex, distantly denticulate, glabrous, dark-green, paler beneath with prominent reticulate venation; petiole about 1 in. long. Male flowers in short 4 to 12 in. pedunculate, corymbose racemes; bracts small, caducous; calyx-tube ¾ to 1¼ in., very narrow, inflated above; segments minute, setaceous; petals oblong, acuminate, with the fimbriæ much branched and very long at end of petals, but shorter on the sides, doubled inwards in the bud. Female flowers shortly stalked, solitary; calyx-tube nearly 2 in. long, very much produced above the ovary; segments longer than in the male flowers. Fruit oblong about 4½ in. long, 3 in. diam.; pericarp a deep-orange colour, marked by about 8 longitudinal lines, shortly acuminate at top and bottom; sarcocarp about ⅓ in. thick; seeds embedded in a juicy pulp of a scarlet colour. Seeds 6 to 8 lines long, 3 lines broad, and about 1 line thick, flattish quadrangular, corners more or less shortly lobed and glossy. The above should be substituted for the former notice in "Queensland Agricultural Journal," Vol. XVIII., 340.

Hab.: Scrubs near Herberton, ***R. C. Ringrose,*** **1907; Evelyn Scrub,** ***J. A. Hamilton,*** **July, 1909.**

Order LILIACEÆ.

TRIBE ASPHODELEÆ.

ASPHODELUS, Linn.

Perianth polyphyllous, rotate when expanded, with 6 subequal 1-nerved oblanceolate segments. Stamens almost hypogynous, included; filaments flattened at the base; anthers versatile. Ovary sessile, globose; ovules 2 in a cell, collateral; style filiform; stigma capitate. Fruit a globose capsule. Seeds black, often solitary in the cells. Annual or perennial herbs, with leaves in a basal rosette, and white flowers in panicled racemes. Species, about 6 or 7. Europe and eastward to India.

A. fistulosus, *Linn.* Onion-leaved Asphodel. A fleshy-fibrous rooted annual or perennial, with a tuft of radical fistular leaves, the sheaths short, loose, and scarious. Flower stems terete, about 1½ ft. high, with few branches mostly occupied by the racemes of flowers. Pedicels solitary, erecto-patent, 2 to 3 lines long. Bracts, lower ones lanceolate, upper ones deltoid. Perianth about 6 lines long, star-like, segments oblanceolate, about 2 lines broad, the midrib reddish. Stamens 3 shorter than the others, hairy at base; anthers oblong. Capsule globose turbinate, 2 to 3 lines diam., valves transversely rugose. Seeds with black testa, 2 in each cell.

Hab.: A native of Southern Europe and Afghanistan. It has begun to run out into the pasture near Toowoomba. *H. A. Longman.* This plant is a near ally of our Native Onion (Bulbine); thus it may prove deleterious to stock.

Order FUNGI.

FAMILY PERONOSPORACEÆ.

PHYTOPHTHORA, De Bary.

(So called from the species causing injury to plants.)

Mycelium passing into the cells of the matrix, which it destroys; furnished with few or no suckers. Hyphæ conidiophore for the most part or slightly branched. Conidia at first acrogenous, then likewise pleurogenous, ovate; apex papillate, propagating by zoospores. Oospores globose, covered by a somewhat slender smooth brown epispore.—*Sacc. Syll. Fung.* vii. 237.

P. infestans, (Mont.) *De Bary.* Research Potato Fungus in Journ. Agric. Soc., Sacc. Syll. Fung. vii. 237. Hyphæ with graceful mycelia, suckers always wanting, with slender conidiophores gradually attenuated upwards, inflated once or more in bladder-like vesicles towards the conidia-bearing apex, carrying at the top 1 to 5 scattered branches. Conidia ellipsoid or ovoid, 27-30 μ by 15-20 μ. Zoospores about 10.—*From Sacc. l.c.* This fearful pest has lately been found by Mr. H. Tryon to have destroyed a number of the Queensland potato crops, but was never seen in this State previously.

Order FILICES (BRITISH NEW GUINEA.)

HYPOLEPIS, Bermh.

H. papuana, *Bail.* This is a rampant aculeate species, according to the Rev. Copland King, attaining the height of 14 ft., probably quadripinnate. The branches and branchlets of a more or less glossy-brown, and for the most part bearing prickles and short glandular hairs. The ultimate pinnæ 2 to 3 in. long, bearing oblong pinnules about 1 in. long, shortly stalked or sessile, deeply lobed, the lobes bluntly ovate, bearing just above the sinus on the upper side of most a very membranous sorus.

Hab.: Yodda Road and Eia River, British New Guinea, *Rev. Copland King*, Boku; British New Guinea, *Mrs. H. P. Schlencker*, No. 46.

PTERIS, Linn.

P. moluccana, *Blume, Enum. Fil. Jav.* p. 208: Hook. Spec. ii., p. 158, t. 112. B. Fronds glabrous, ample pinnate, tall, broad-oblong, pinnæ elongated broad-linear subfalcate, obliquely cuneate-attenuate at the base, nearly sessile firm-membranaceous satiny, narrow, cordate-acuminate, and spinuloso-serrate at the apex, very finely transversely striated with the close-placed but (on both sides) conspicuous simple or forked veins. Involucres narrow continuous. Rhachis subtetragonous, furrowed at the sides, purple-brown, glossy.—*Hook. l.c.*

Hab.: Waria River, British New Guinea, *Rev. Copland King*, No. 124; Boku, British New Guinea, *Mrs. H. P. Schlencker*, No. 65.

With the above specimens, the following ferns were received from the same correspondents:—

Rev. Copland King—

Lygodium reticulatum, *Schkuhi.*
Schizæa Forsteri, *Spreng.*
Marattia fraxinea, *Sm.*
Hymenophyllum ooides, *Baker*
Davallia Blumeana, *Hook.*
Lindsæa davallioides, *Bl.*
Hypolepis tenuifolia, *Bernh.*
Cheilanthes tenuifolia, *Sw.*
Pteris ensiformis, *Burm.*
Pteris Cretica, *Linn.*, forma multiaurita, *Hook.*
Asplenium laserpitiifolium, *Lam.*
Asplenium affine, *Sw.*
Asplenium decussatum, *Sw.*
Asplenium sylvaticum, *Presl.*
Scolopendrium mambare, *Bail.*
Polypodium irioides, *Poir.*
Polypodium stigmosum, *Sw.*
Polypodium sinuosum, *Wall.*
Polypodium rigidulum, *Sw.*
Polypodium accedens, *Bl.*
Notholæna distans, *R. Br.*
Grammitis pinnata, *F. v. M.*
Grammitis involuta, *Don.*
Grammitis quinata, *Hook.*
Acrostichum virens, *Wall.*
Acrostichum drynarioides, *Hook.*

Mrs. H. P. Schlencker—

Gleichenia flagellaris, *Spreng.*
Lygodium dichotomum, *Sw.*
Schizæa Forsteri, *Spreng.*
Aspidium molle, *Sw.*
Aspidium exaltatum, *Sw.*
Polypodium Phymatodes, *Linn.*

The Orchard.

FRUIT-GROWING IN QUEENSLAND.

By ALBERT H. BENSON, M.R.A.C.

Very few persons have any idea of the magnitude or the resources of this State of Queensland, and in no branch of agricultural industry are they more clearly shown than in that of fruit-growing. Here, unlike the colder parts of the world or the extreme tropics, we are not confined to the growing of particular varieties of fruits, but, owing to our great extent of country, and its geographical distribution, we are able to produce practically all the cultivated fruits of the world, many of them to great perfection. There are, however, one or two tropical fruits that are exceptions, such as the durien and mangosteen, whose range is extremely small, and one or two of the berry fruits of cold countries which require a colder winter than that experienced in any part of this State. It will, however, be seen at once that a country that can produce such fruits as the mango, pineapple, banana, papaw, granadilla, guava, custard apple, litchi, sour sop, cocoa nut, bread fruit, jack fruit, monstera, alligator pear, and others of a purely tropical character; the date, citrus fruits of all kinds, passion fruit, persimmon, olive, pecan nut, cape gooseberry, loquat, and other fruits of a semi-tropical character, as well as the fruits of ~~the more~~ temperate regions, such as the apple, pear, plum, peach, apricot, quince, almond, cherry, fig, walnut, strawberry, mulberry, and others of minor importance, in addition to grapes of all kinds, both for wine and table, and of both European and American origin, offers a very wide choice of fruits indeed to the prospective grower. Of course, it must not be thought for a moment that all fruits mentioned can be grown to perfection at any one place in the State, as that would be an impossibility, but they can be grown in some part of the State profitably and to great perfection.

The law of successful fruit culture is the same here as in all other fruit-producing countries—viz., to grow in your district only those fruits which are particularly adapted to your soil and climate, and to let others grow those fruits which you cannot grow, but which their conditions allow them to produce to perfection. The intending grower must, therefore, first decide on what fruit he wishes to grow, and when he has done so, select the district best suited to their growth.

CLIMATE.

As previously stated, the successful culture of fruit depends mainly on the right kinds of fruit being grown in the right soil and climate. This naturally brings us to the question of climate, and here one again gets an idea of the extent of our country, as we have not one but many climates. Climate is a matter of such vital importance to fruit-growers, and there is such a general lack of knowledge respecting the climate of Queensland, that a little information on this point is desirable. I am afraid that there is a very general impression that Queensland has a climate that is only suitable for a coloured race; that it is either in the condition of a burnt-up desert or is being flooded out. That it is a country of droughts and floods, a country of extremes—in fact, a very desirable place to live out of. No more erroneous idea was ever given credence to, and, as an Englishman born, who has had many years' practical experience on the land in England, Scotland, the United States of America, and the various Australian States, I have no hesitation in saying that, as far as my experience goes—and it is an experience gained by visiting nearly every part of the State that is suited for agricultural pursuits—that, taken as a whole,

it is difficult to find a better or healthier climate in any other country of equal area. Our climate has its disadvantages, no doubt, particularly our dry spells, but show me the country that has a perfect climate. We have disadvantages, but, at the same time, we have great advantages; advantages that, in my opinion, outweigh our disadvantages.

Our eastern seaboard, extending from the New South Wales border in the south, a few miles to the south of the 28th degree of south latitude, to Cape York, some 20 miles north of the 11th degree of south latitude, contains our best districts for the growth of tropical and semi-tropical fruits. The coastal climate, however, varies considerably, and is governed by the proximity or otherwise of the coast ranges. When they approach the coast there is always more rainfall, and as they recede the rainfall decreases. With one or two exceptions, where the coastal range is a considerable distance inland, the eastern coastal districts have a sufficient rainfall for the successful culture of most fruits, though they are subject to a dry spell during winter and spring. During this period of the year, the weather is extremely enjoyable; in fact, it is hard to better it, even in our extreme North. But as summer approaches, thunderstorms become prevalent, and are accompanied by more or less humid conditions, which, though good for fruit development, are not quite so enjoyable as the drier months. Summer is our rainy season, and the rainfalls are occasionally very heavy. The weather is warm and oppressive, particularly in the more tropical districts; but these very conditions are those that are best suited to the production of tropical fruits. The climate of those districts having the heaviest summer rainfall is somewhat trying to Europeans, particularly women, but it is by no means unhealthy, and in the hottest parts, having the coast range nearly on the coast, there is, within a few miles, a tableland of from 2,000 to 4,000 ft. elevation, where the climate is cool and bracing, and where the jaded man or woman can soon throw off the feeling of lassitude brought about by the heat and humidity of the seaboard. In autumn the weather soon cools off, drier conditions supervene, and living again becomes a pleasure in one of the best and healthiest climates to be met with anywhere. Practically all the district under review has a sufficient rainfall for the growth of all fruits suitable to the climate, though there are occasionally dry spells during spring, when a judicious watering would be a great advantage. This does not imply a regular system of irrigation, but simply the conserving of surplus moisture in times of plenty by means of dams across small natural watercourses or gullies, by tanks where such do not occur, or from wells where an available supply of underground water may be obtained. The water so conserved will only be needed occasionally, but it is an insurance against any possible loss or damage that might accrue to the trees during a dry spell of extra length. So far, little has been done in coastal districts in conserving water for fruit-growing, the natural rainfall being considered by many to be ample; but, in the writer's opinion, it will be found to be a good investment, as it will be the means of securing regular crops instead of an occasional partial failure, due to lack of sufficient moisture during a critical period of the tree's growth. The average yearly rainfall in the eastern seaboard varies from 149 in. at Geraldton to 41 in. at Bowen, the mean average being about 90 in. to the north and 49 in. to the south of Townsville. Were this fall evenly distributed throughout the year, it would be ample for all requirements. Unfortunately, however, it is not evenly distributed, the heavy falls taking place during the summer months, so that there is often a dry spell of greater or less extent during the winter and spring, during which a judicious watering has a very beneficial effect on fruit trees, and secures a good crop for the coming season. The rainfall shows that there is no fear of a shortage of water at any time; the only question is to conserve the surplus for use during a prolonged dry spell. These conditions are extremely favourable for the growth of all tropical and semi-tropical fruits, as during our period of greatest heat,

when these fruits make their greatest call for moisture, there is an abundance of rain, and during the other portions of the year, when the call is not so heavy, it is usually an inexpensive matter to conserve or obtain a sufficient supply to keep the trees in the best of order. Throughout the southern half of this seaboard frosts are not unknown on low-lying ground, but are extremely rare on the actual coast, or at an elevation of 300 to 400 ft. above the sea, so much so that no precautions are necessary to prevent damage from frost. We have, unlike Florida and other parts of the United States of America—great fruit-growing districts—no killing frosts, and during the winter of 1908, one of the coldest on record, and one of the driest, nowhere were our pineapples —fruit nor plants—injured, except on low-lying ground, even in the Southern part of the State, and mangoes, bananas, &c., were uninjured.

In the more tropical North frosts are unknown on the coast, and there is no danger to even the most delicate plants from cold.

Running parallel with the coast we have a series of ranges of low mountains, running from 2,000 ft. to 6,000 ft., the general height being from 2,000 to 3,000 ft., and at the back of these ranges more or less level tablelands, sloping generally to the west. On and adjacent to these ranges in the Southern part of the State, there are fairly sharp frosts in winter, but the days are warm and bright. This is the district best adapted for the growth of deciduous fruits and vines, table varieties doing particularly well. It is a district well adapted for mixed farming and dairying, as well as fruit-growing; the climate is even and healthy, and is neither severe in summer nor winter. The average rainfall is some 30 in., and is usually sufficient, though there are dry periods, when a judicious watering, as recommended for the coast districts, would be of great value to fruit and vegetable growers. The more northern end of this tableland country has a much better rainfall—some 40 in. per annum—and frosts, though they occur at times, are not common. Here the climate is very healthy, there are no extremes of heat and cold, and, lying as it does inland from the most trying portion of our tropical seaboard, it forms a natural sanatorium to this part of our State.

Further west the rainfall decreases, the summers are hot—a dry heat, as distinct from the more humid heat of the coast, and much more bearable. There are frequent frosts in winter, particularly in the Southern part of the State. Fruit-growing is only carried on to a slight extent at present, and then only with the help of water, but when the latter is obtainable, very good results are obtained. Grapes do well, both wine and table, and for raisin-making. Citrus fruits are remarkably fine, the lemons especially, being the best grown in the State. The trees are less liable to the attack of many pests, the dryness of the air retarding their development, if not altogether preventing their occurrence. The date plum is quite at home here, and when planted in deep sandy land, and supplied with sufficient water, it is a rapid grower and heavy bearer. As an offset to the smallness of the rainfall, there is a good supply of artesian water, distributed over a wide range of country, that can be obtained at a reasonable rate, and that is suitable for irrigation purposes. All bore water is not suitable for irrigation, however, as some of it is too highly mineralised, but there are large areas of country possessing an artesian supply of excellent quality for this purpose. It will thus be seen that we have in Queensland, roughly, three distinct belts of fruit-growing country—

1st.—The Eastern Seaboard, and the land adjacent to it, suitable for the growing of tropical and semi-tropical fruit;

2nd.—The Coastal Tablelands, suitable for the growth of deciduous fruits, vines, olives, and citrus fruits in parts;

3rd.—The Central Tablelands, suitable for the growth of grapes, for table and drying, dates, citrus fruits, &c., but requiring water for irrigation to produce profitably.

So far, I have confined my remarks mainly to the climatic side of fruit-growing, and, before dealing with the growing of the different kinds of fruit, I will say a few words about our fruit soils, and will deal with them in districts, as I have endeavoured to do in the case of climate.

1ST.—SOILS OF EASTERN SEABOARD, AND LAND ADJACENT TO IT, SUITABLE TO THE GROWTH OF TROPICAL AND SEMI-TROPICAL FRUIT.

Several distinct types of soil are found that are well adapted for fruit-growing, but they all have one general characteristic which is a *sine qua non* of success—viz., they must possess good natural drainage, so that there is no danger of their becoming waterlogged or soured during periods of continued or heavy rainfall, as these conditions are fatal to fruit culture under tropical and semi-tropical conditions. Of such soils, the first to be considered are those of basaltic origin. They are usually of a chocolate or rich red colour, are of great depth, in parts more or less covered with basaltic boulders, in others entirely free from stones. The surface soil is friable and easily worked, and the subsoil, which is usually of a rich red colour, is easily penetrated by the roots of trees and plants grown thereon. Occasionally the subsoil is more compact, in which case it is not so good for fruit-tree growth, but is better adapted for that of sugar-cane, corn, grass, &c. These basaltic soils are usually rich, and are covered in their virgin condition with what is termed scrub—a dense mass of vegetation closely resembling an Indian jungle. The scrub growth is totally distinct from forest growth, which will be described later, in that the bulk of the timber growing in it, much of which is of large size, is of a soft nature, and once cut down soon rots away. Imagine a dense wall of vegetation, consisting of large trees running up to 100 or 150 ft. in height, with trunks ranging from 2 to 8 ft., or even more, in diameter, and between these trunks an impenetrable mass of smaller growths, all of the most vivid green colours, together with innumerable vines and creepers that are suspended from the branches of the trees, hanging in festoons, creeping palms and bamboos, ferns, and orchids of many kinds, both on the ground and growing on the tree trunks, as well as many beautiful foliage plants only found in hothouses in England, and you will have a faint idea of what a virgin scrub in coastal Queensland is like. Much of the timber of the coastal scrubs is of considerable commercial value for building purposes and furniture making, and is, or should be, so utilised prior to felling and burning off.

True scrub lands are not by any means the most difficult to clear, though to a "new chum" the work will appear at first of a Herculean character. Brushing the dense undergrowth and then felling the timber at a face costs from £1 10s. to £2 per acre, according to density, size of timber, and proportion of hardwood trees contained in it, and once this is done the fallen mass is allowed to become thoroughly dry, when it is burnt off. A good fire is half the battle, as the subsequent work of burning off the heavy timber left from the first burn is comparatively light. No stumps are taken out, as the bulk are found to rot out in a few years, and their presence in the soil is no detriment to the planting of such crops as bananas or even citrus fruit trees. No special preparation of the land, such as breaking up, &c., is necessary prior to planting. Holes are dug, trees or bananas are planted, and the whole cultivation for the first few years consists in keeping down weed growths with the chipping hoe. Once the stumps have rotted out, the plough and other implements of culture take the place of the hoe. These soils are especially adapted for the growth of oranges, limes, mandarins, mangoes, bananas, pineapples, papaws, custard apples, strawberries, and cape gooseberries in the South; in fact, for nearly every kind of tropical and semi-tropical fruit.

Some basaltic soils are occasionally covered with forest in the place of scrub, or a mixture, part scrub and part forest. Forest country, as distinct

from scrub, is open-timbered country, with little undergrowth and no vines or other creepers. The timbers are also, as a rule, very hard, and the stumps will not rot out. Such land, when at all heavily timbered, is much harder to clear and get ready for fruit-growing than true scrub, as all timber must be felled and burnt off, and all stumps and roots taken out, so that the land can be thoroughly broken up and brought into a good state of tilth prior to planting. These soils are suitable to the growth of similar fruits to the true scrub soils, but, as a rule, they are not as rich. The second class of soils suitable to fruit-growing are of alluvial origin, and are of a sandy, loamy nature, of fair depth. They are usually met with along our creeks and rivers, or in the deltas of our rivers. In their virgin state they are either covered with scrub or forest, or a mixture of both, but the growth is seldom as strong as on the red volcanic soils. Heavy alluvial soils are not suitable for fruit culture, and are much more valuable for the growth of farm crops, but the light sandy loams and free loams of medium character suit all kinds of fruit to perfection. These soils usually are easy to work. They retain moisture well when well worked, and frequently they are capable of being irrigated, either from adjacent creeks or rivers, or by water from wells. These soils are some of our best for citrus fruits, and are well adapted for the growth of pineapples and bananas, as well as most other tropical fruits, when free from frosts. The third class of soils are free sandy loams, either scrub or forest. They are of various colours, and range in texture from light sandy loams to medium loams; they possess excellent drainage, and though, when covered with forest, they are not naturally rich, they make excellent fruit soils, and respond rapidly to systematic cultivation and manuring. They are usually of sandstone of granitic origin, and, when covered with scrub in the first place, grow good crops for the first few years, when they become more or less exhausted in one or more available plant foods, and require manuring. These soils, like the sandy alluvial loams, are easy to work, retain moisture well when kept in a state of perfect tilth, and respond readily to manuring. They will grow all kinds of fruits when free from frost. There are other soils on which fruit can be grown, but those mentioned represent those most suitable. The land on which these soils occur is often much broken, particularly in rich scrub country; it is fairly level when of alluvial origin, and more or less rolling, as a rule, when of a sandy, loamy nature. High, ridgy, free, loamy country is usually the most free from frost, and alluvial flats the most liable to it.

2ND.—SOILS OF THE COASTAL TABLELANDS, SUITABLE FOR THE GROWTH OF DECIDUOUS FRUIT.

Starting from the southern part of the State, adjoining the New South Wales border, the fruit soils are all of granitic origin. The country is much broken, but between the ridges and along the creek flats there is a considerable area possessing soils varying from a coarse granitic, gritty soil to a fine granitic soil; that on the creeks of an alluvial nature, but still granitic. These soils vary considerably in quality, but are, as a rule, easy to work, and retain moisture well. They are covered with open forest, and are particularly adapted to the growth of apples, plums, peaches, and grapes, though other deciduous fruits are grown, but not to the same excellence as those mentioned. Proceeding north the fruit soils are either sandy loams or loams of a brownish colour of volcanic origin. The former are suitable for almonds and wine grapes, and the latter for peaches, apricots, pears, apples and especially olives. Further north a few of these fruits may be grown on loamy soils, together with citrus fruits, but, commercially, deciduous fruits are confined to the southern end of this district, the winter temperature being too high for their successful growth further north, as the trees get no winter rest, hence do not mature their fruit-bearing wood properly.

3rd.—Soils of the Central Tablelands, suitable to the Growth of Grapes, Dates, Citrus Fruit, Etc.

At the southern end of the State the fruit soils are all of a sandy nature. Nothing else is used in any quantity, as sandy soils alone will retain sufficient moisture for the growth of grapes and fruit trees during dry spells, and even then only when kept well and deeply worked. Further north, where suitable artesian water is available, the best fruit soils are also free loams of a sandy nature, either alluvial or open forest soils, but deep, and possessing perfect drainage, as irrigation on land without good natural drainage is fatal to fruit culture. These sandy loams are also easy to work; though by no means rich, they, on account of their depth, grow good crops of fruit by means of irrigation, and the fruit, such as dates, oranges, lemons, grapes, &c., is of very fine quality. The fruit soils of this district are covered either with open forest—the trees being of comparatively small size—or with a scrubby undergrowth through which a few larger trees are scattered. Nearly all the timber of this district is extremely hard, is more or less stunted, and burns readily, hence clearing is not a very expensive item.

THE CULTIVATION AND USES OF THE ROSELLA.

By DANIEL JONES.

At the request of some of our readers who have only lately taken up farming pursuits, we republish the following article on the Rosella, which appeared in the Journal in May, 1900:—

The Rosella *(Hibiscus Sabdariffa)* is one of our most valuable fruits, and, from the standpoint of the thrifty housekeeper, few edibles in the range of domestic cookery lend themselves more usefully to the stocking of a housewife's cupboard. In dealing with this fruit, I shall, as briefly as possible, refer to the cultivation of the plant as well as indicate a few methods of preparing the fruit for domestic needs.

Seed.

The most important matter to attend to, in the first instance, is to procure sound, fertile seed. Seed grown in the Northern part of the colony is usually safer to use than that grown in our Southern districts, it being on the whole better developed and more likely to be fertile. The Northern growers having a longer maturing season, owing to the absence of frost, a fuller germination and hence a better quality of seed is produced by them. Nevertheless, in certain seasons in our Moreton districts, it is possible to save seed fully equal to that grown in more tropical parts, as I have experienced; yet it is by no means certain that the season may prove propitious, and the local seed may turn out barren, although, to the inexperienced eye, it may appear otherwise.

Soil.

Any moderately good soil will grow rosellas well. Land with a clay subsoil, if the latter be near the surface, had better be avoided if cultivating on a large scale; but for an allotment garden, where only a few trees are grown, the plant, with an average amount of attention, can be cultivated well enough to give returns sufficient to fill the cupboard for family needs, though perhaps not on so lavish a scale as if grown under more favourable conditions.

The shrub being hardy and, as a rule, fairly ornamental, given fair treatment, is calculated to adorn and prove useful in the kitchen garden no less than in the field.

Sowing.

My practice was to fix upon small patches of clean soil for a seed bed contiguous to the area proposed to be set out. For instance, when planting

several acres, I found, by my method of setting, I could treat a much larger area with less labour, and do it more efficiently, by drawing from the nearest seed beds as the transplanting proceeded. For the ordinary kitchen garden it will suffice to mark out a plot a few feet square and lightly cover the seeds, well watering them and keeping the plot free of weeds until the plants are about 6 in. high, and then set them out in rows about 6 ft. apart. If the grower is not disposed to start his seed from beds, the latter can be sown where the bushes are to remain, and thus the trouble of transplanting is saved; but precaution must be taken to have a few spare plants to meet the contingency of having some destroyed by grubs or other causes, so that the vacant spaces can be filled up. The best time to establish seed beds is during the month of October. Early sowing is recommended in the Southern parts of the colony, as, in the event of early frosts coming on, the maturing of the fruit will be seriously affected.

I have observed that late plantings in November generally prove fruitful, but, owing to the shortened period for attaining maturity, the plants will only be imperfectly grown, and produce but a proportionately limited crop. Hence, to obtain the most satisfactory results, early propagation of the plant is imperative. Of course, in our Northern regions and in part of our Southern coastal districts, which are comparatively immune from early frosts, the planting season can be safely put off until November or the early part of December without undue risk to the crop.

TRANSPLANTING.

In the ordinary course of garden work, the transplanting is usually performed by the simple removal of the plants from the seed bed, without unduly tearing the tender root. A small hand fork for loosening the soil, so that the plant can be lifted in good order, is all that is needful. The plants having been raised, set the plants out in regular rows, and in well-firmed fertile soil, giving due heed to the equal extension of the root fibres, which not only helps to hold the plant firm as against strong winds which often seriously affect the shrub when in vigorous growth, as it acquires a head considerably out of proportion to its foothold, but it also enables the roots by the regular radiation to find more plant food for the sustenance and early development of the bush—all of which, though apparently trivial precautions, nevertheless have a very important bearing on the cultivation of this fruit. Perhaps my own practice in handling this crop as a feature of field and orchard operations may now be brought in. During my early orchard efforts, while my young trees were being planted out, it became necessary to discover what catch crop could be cultivated with advantage between the rows of orchard trees. My choice for some seasons, fell on the rosella as being a crop which would not unduly interfere either with the cultivation of my fruit trees or exhaust the soil to any serious extent. The first lesson in orchard operations, more especially with young trees, is to have and keep your land clean from weeds at the least possible cost, which at once suggests the employment of labour-saving machinery. I determined to try a system of my own devising, which proved very successful.

As my planting operations necessarily spread over several acres of orchard, and at most two rows of plants could be set in between each row of fruit trees, in order to facilitate transplanting over this area, I, as before stated, selected suitable spaces contiguous to my proposed planting areas for seed beds, sowing the seed not so thickly as ordinary for reasons hereafter given. These beds were well watered and kept clean, so that in the transfer of plants no weeds would be conveyed to the orchard land. Most persons acquainted with the routine of orchard work will appreciate the necessity for keeping the land clean to the very last possible moment by the aid of horse implements. Immediately after running the harrows or scarifier over the land and as soon as the soil was

in a satisfactory condition, I pegged out my line of drills between the rows of fruit trees, and with an American post-hole digger, with one drive of the implement, raised the necessary amount of soil to enable the transplanted plant to occupy the space, and thus rapidly traversed my length of drill. My next operation was to pick up the plant and soil with the digger from the nearest seed bed, and transfer plant and soil into the hole prepared for it.

The opening and closing mechanism of the digger lends itself most perfectly to this work, and a pressure of the foot on each side of the plant is all that is needed to permanently fix it in its place. Thus the plant is set with the soil at its root undisturbed, and it continues to grow without check.—This system I have successfully adopted in transplanting melons and other plants of a delicate nature that usually do not thrive under harsher treatment. For filling up misses in the rows I have found with many crops this instrument quite as valuable as in its legitimate use as a post-hole digger. But an implement that will satisfactorily perform in some soils may prove a comparative failure in others, hence I do not claim that in all soils success will necessarily follow. I am quite aware that the waxy black soils or heavy clays are not best adapted for my system, but on such soils as I then worked—red loam of a sandy nature—or any of our light scrub soils I know of no better system to adopt. The propagation of this plant by cuttings is not commonly adopted, and indeed is not as satisfactory as from seedling plants; still there are times when the system will prove worthy of a trial. It may be that from failure of the seed to germinate there are not enough plants to fill the area or to supply misses in the rows transplanted. As it is, however, imperative to replace them, propagation from cuttings, or, more properly, branches, will be expedient. When the shrubs are 1 ft. or 18 in. high, select from your most vigorous and bushy shrub a couple of the lower branches. Do not cut them, but, with a gentle snatch, break off the wood close to the main stem of the shrub. It will break off very easily, and on examination of the branch you will observe the edging of the break will indicate a strong rim of bark which will, on transplanting, quickly become callous and soon provide a good root-hold for the shrub. Bushes propagated in this way in some seasons bear when the more vigorous and earlier shrubs carry little or no fruit, but they are invariably more stunted in growth, yet usually yield a fair crop. Thus, by adopting any of the systems here described, the prospective grower can hardly fail. With a moderate rainfall, rosellas will grow luxuriantly in any locality where the soil is suitable, and when winter frosts do not set in too early to allow of the proper maturing of fruit. Too exposed situations should, if possible, be avoided, as high winds, blowing on the bush with its luxuriant foliage, often break down the branches, and, in times of continued wet weather, blow the shrubs over.

PICKING THE FRUIT.

This is a rather monotonous occupation for adults, and is more suitable for the young folks. As soon as the fruit is matured, it is advisable to lose no time in gathering. When this work is delayed, I have observed a tendency on the part of the fruit stalk to so toughen as to be an impediment to quick gathering, and, moreover, it leaves the fruit exposed after maturity on the shrubs to become to some extent deteriorated by the attacks of aphis, which often affect it at this stage. In picking for market, care should be observed to pick the fruit as free as possible from stalks, leaves, &c., as, when required by jam factories, the presence of such superfluous matter will militate against its sale.

SHELLING.

The removal of the edible covering from the seed pod is a somewhat wearisome business, more especially when it depends on hand labour. Usually, the pod is taken in the hand and the covering is dragged off piecemeal, and a knife is employed to sever the base of the pod, which facilitates the removal of

the covering, both of which operations are rather slow. Here comes in the truth of the old adage that "necessity is the mother of invention," and, as a result, an invention is to be obtained from some of our city seedsmen that overcomes the difficulty of separating the pods from the fruit, and, the cost of the instrument being moderate, any grower on a large scale who requires to separate the fruit will do well to purchase one. The diagram shows two forms

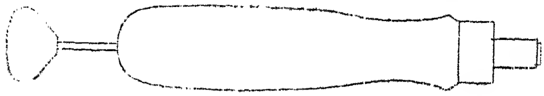


FIG. 1.

of the instrument. Fig. 1 was invented and patented by Mr. T. Chalk, of Coorparoo; and Fig. 2 is an improvement on it, which I made for my own use.

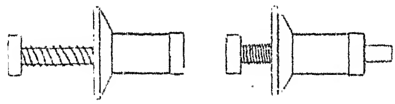


FIG. 2.

The difference in the two instruments is that the piston in mine is moveable and is supplied with a spring, and, that being so short, it can be worked with one hand whilst the fruit is held in the other. Those who care to construct the apparatus for themselves can easily do so with little trouble or cost. My appliance was home-made, and, although crude in appearance, answered its purpose very well. To describe the article, simple though it be, is not very easy; but the outlines being given, the ingenious grower will perhaps be able to, by help of the illustration here given, seize upon the design. It can be made by taking a common cotton-reel and whittling down one end to receive a ferrule, for which I used a small brass cartridge-case. This fits on the end of the reel and acts as a cutter, which is worked by taking the pod in one hand and pressing the ferrule into the stalk-end of the pod and giving it at the same time a slight turn, which causes the cutter to pass clean through the covering, and so relieves the pod. To expel the latter from its covering, you make a small pusher from a piece of round wood that will just work through the hole in the centre of the reel. This piece of wood is made with a flat head, so that it rests against the palm of the hand without hurting it when pressing the pad out, while between the top of the pusher and the reel-head is put a small spiral spring made out of any light wire. This is put on to draw back the pusher after it has driven out the pod, and thus you can quickly and easily prepare this fruit for use.

UTILISING THE FRUIT.

Most housewives are familiar with the various uses of the rosella. For jam-making it is well adapted, making a palatable, easily-kept product, if put up in earthenware or glass. Unfortunately, rosellas contain an acid principle which precludes putting up this class of fruit in ordinary tinware, and hence some failures have been experienced in this respect. For pickles the fruit is well adapted, and it makes an excellent condiment. In my own experience, I have found that the best method of handling the fruit was to dry it after removing the pod from the capsule, which, if done with the instrument before described, cuts out the covering nearly whole, which is thus better adapted for drying purposes. I have kept the dried fruit in jars and tins for two or three years in good order. Rosella-growers would do well to give this mode of preparing the fruit more attention, for I have found it far and away the best in saving the crop. All that is necessary to do in drying is to prepare the fruit as I have shown, and, in some roomy, airy position (not necessarily in the sun), place the fruit either on trays or sheets on the floor, allowing as much air to pass through and over the fruit as possible. In a few days all superfluous moisture will have evaporated, and the dried article can be packed away in

jars. By this means rosellas can be had in good condition all the year round. All that is needful, when required for use for jam, tarts, &c., is to take the quantity necessary and pour over the fruit a little water, when it will absorb the water and resolve itself into apparently fresh fruit. The large grower has in this method a certain way of keeping such surplus fruit that may not be in immediate demand, or that the low prices ruling may deter him from marketing as ordinary fruit. I am of opinion that fruit put up in this form, and exported to the London market, should give better results than the already proved failures in the form of jams.

It is not commonly known that in the utilisation of the choko, now fast becoming a popular vegetable, that very pleasant tarts can be made by using that vegetable (*Sechium edule*) in conjunction with the rosella. It is well known that many object to what they term the excessive tartness of the rosella. Using it in conjunction with the choko this tartness is modified, and tends to make both these fruits more appetising. In fact, rosellas are specially adapted for blending with less tart fruit, as they give a flavour to many fruits and vegetables which otherwise would not be so acceptable for table use.

WINE-MAKING.

This is a further use for rosellas. Although I have no personal experience in this method of dealing with the fruit, I know that a good palatable beverage is made from rosellas. To those who care to try to utilise this fruit in this manner, I give here a recipe sent me by a friend who has a wide reputation as a maker of rosella wine :—

Rosella Wine.

Put your fruit into a cask that has one head out. Pour boiling water over the fruit, rather more than enough to cover it. Let this stand for about three days—stir now and again.

At the end of three days, strain the liquor into another cask—*this cask to have both heads in.* Then for every gallon of liquor take 3 lb. of sugar, and make a good thick syrup of same.

Pour this syrup while hot into the liquor, and stir well.

Leave the cask with the bung out until fermentation starts. Should this not occur, say, in twenty-four hours, add a bottle of yeast. Keep this cask in as even a temperature as possible, as this will help the fermentation.

In the process of fermentation, you will lose some of your liquor. Should it ferment thoroughly, save the liquor that overflows from the bung-hole, and put it back into the cask ; but should you find this not enough to keep your cask full, add a little warm water.

When the liquor has almost fininshed fermenting—say when it stands at 3 degrees density by the saccharometer (Beaumè)—bung up the cask and leave for three months. Then bottle.

From *Hibiscus Sabdariffa* fibre has been repeatedly made, specimens of which and of cloth manufactured from it are to be seen in the museum of the Agricultural Department, William street. Some few years ago, a local grower gave the matter of the production of this plant considerable attention, specially in view of the utilisation of his crop for fibre purposes. I am of opinion that his failure to go on with the matter was consequent on want of machinery to prepare the fibre, which is a drawback only too patent with regard to the development of many industries of this character in Queensland.

DISEASES.

The diseases affecting this plant are not usually very formidable, although in certain seasons a grub attacks the roots of the bushes, and a disease, apparently fungoid in character, sometimes affects the shrub. The common aphis is usually present in quantity on matured fruit ; but, on the whole, while this crop is, in common with others, susceptible to occasional serious injury from pests, it is hardy, useful for many purposes, and profitable to grow.

PRINCIPLES OF PRUNING APPLIED TO SPECIFIC PLANTS.

PRUNING THE APPLE.

In pruning a fruit-bearing plant like the apple, attention must be given not only to the height and formation of the head, but to the removal of wood as well. The apple bears fruit on spurs which are themselves developed from wood one year or more of age. For that reason, therefore, the removal of wood which carries fruit spurs reduces the crop the tree is capable of bearing. This, then, is a practical way of thinning the fruit. Besides accomplishing this result, pruning can be used to lessen the annual growth and force the energy of the plant which would naturally be used in making wood into the fruit, thus increasing its size or enabling the tree to carry a larger quantity than would be possible were a normal wood growth permitted.

FORMING THE HEAD.

Modern orchardists have come to look upon the low-headed tree as more desirable than those headed high. A head which is 2½ to 3 ft. from the ground is at present considered more desirable than one which is 6 ft. or more from the ground. The latter height was formerly frequently used. In forming the head, care should be taken to have the framework branches disposed at different heights along the body of the tree—say, from 3 to 6 in. apart, and distributed as evenly as possible around the body as a central axis; that is when viewed from above the picture presented would be that of a wheel, the hub being the central axis of the tree and the framework branches representing the spokes.

MAIN BRANCHES.

For an apple-tree three branches are considered the ideal number. More may be left upon some varieties, particularly those which are strong growers, and upon trees which have a well-developed root system at planting time. If, however, the roots have been badly mutilated in removing the tree from the nursery, it will be safer to reduce the number to three rather than to maintain a larger number. These three main framework branches upon the ordinary first-class nursery tree should not be more than 10 or 12 in. in length. At the close of the first season's growth after planting, each one of these three framework branches should be considered as though it were a separate nursery tree, and if possible three subdivisions of this should be maintained for the wood supply of the second year, the three branches retained being cut back to about the same length as those originally held by the tree as planted in the first place. This operation should be repeated each succeeding year. By so doing, a symmetrical development can be maintained, and by cutting to an outside of an inside bud the habit of the tree can be modified so as to make it upright or spreading in character. Some trees are normally upright in their habit of growth, while others are spreading. This must be borne in mind, and the character of the variety under treatment must be taken into consideration in cutting the branches, so that they will be upright or spreading, according to the desire of the planter.

EFFECT OF CUTTING BACK.

This frequent cutting back of the branches of the tree while it is young prevents the long bare branches which are so characteristic of old orchard trees. It also prevents the tree from growing too tall—a condition which makes it difficult to gather the fruit or spray the tree. With the low-headed trees, less propping is necessary than with trees having long framework branches. The load of fruit is carried nearer the trunk, and the main structural branches, being larger in proportion to their length, are therefore better able to carry any load of fruit which the tree may develop.

ANNUAL AND BIENNIAL CROPS.

Judicious pruning, as has been pointed out, not only facilitates the work of cultivation and spraying, but at the same time determines to a very considerable extent the fruiting habits of the tree—that is, the quantity of bearing wood which a tree carries can be modified by pruning so that it will be practically impossible for the tree to retain more fruit in any given season than the root is capable of supplying with a proper amount of nourishment. With such a balance between the fruit-bearing wood of the tree and its root system maintained, biennial crops will be less likely and annual crops will be more common. Orchardists in general are coming to believe that the reason for the biennial crop in many orchards is due to the fact that during the crop year the trees are allowed to overbear, and that their vitality is therefore so much reduced that it is impossible for them to carry a satisfactory crop the succeeding year. The thinning of the fruit, with the result that a crop is borne each year, has convinced practical growers that overbearing is the cause of the biennial fruit production.

PRUNING THE PEAR.

What has been said of the apple applies equally well to the pear; but since pears are grown both as standards and dwarfs in commercial orchards, a consideration of the pruning of both classes is necessary.

FORMING THE HEADS.

A low-headed pear tree is quite as desirable as a low-headed apple tree. In forming the head of the pear, however more branches may be left than in the case of the apple. While three is given as the ideal number for the apple, as many as four or five may be retained by a well-grown pear tree. These should be distributed about the body so as to give practically an equal space between them, and if possible they should stand at different heights upon the main stem. The number of branches to be left upon any particular tree must, however, be determined by the condition of the root. If much root has been lost, a smaller number of branches should be retained, and those retained should be shorter than in the case of a well-developed root. In general, however, the three, four, or five branches left upon the young pear tree should be shortened to about 10 or 12 in. in length. Each of these should, at the close of the first season, be treated as though it were a separate plant, and the number of shoots which it has developed be reduced to either two or three, and these in turn shortened to at least 12 in. in length. This operation should be repeated from year to year until the tree comes into full bearing, when less shortening will be required. In fact, as the tree grows older it will be found that instead of retaining the original length of the annual shoots, they will reduce themselves in many cases to 6 or 8 in. in length. This is due to the fact that the energy of the root is distributed through a large number of branches rather than to a few. By adhering to this system of pruning, a symmetrical broad-headed tree can be secured, and as fruit bearing increases the framework branches will tend to become more and more drooping.

PRUNING DWARF PEARS.

Dwarf pears are, as a rule, pruned as pyramids. For this reason the nursery trees are handled very differently from standards. Branches are allowed to grow close to the ground, and a central axis clothed with branches from near the ground to its extremity is maintained rather than a bare trunk to a height at which the head is desired, as in the standard tree. In the pyramid these lateral branches are left longest near the ground, and shortest near the apex of the pyramid. This method is adhered to from year to year in pruning the annual growth of the tree. The annual pruning of a pyramid

is of even greater importance than in the case of the standard pear, for upon it depends the symmetrical development of the tree.

It is well known that orchard trees in general tend to make their greatest growth near the extremity of the leading branches. In other words, the leaders are the strongest growers, and it is frequently a difficult task to stimulate lateral branches to grow sufficiently to preserve the symmetrical development in the tree. The manner, therefore, of cutting back the annual growth on the various parts of the tree must be carefully studied in order to preserve the symmetrical development desired. In removing the annual growth from pramidal trees, it should be the aim to cut back to an inside bud each year. This will tend to make the growth of the tree more upright and more compact, while with a vase-formed tree it should be the object to cut to an outside bud each year.

PRUNING THE PEACH.

In general, the peach is a stronger and more rapid grower than the apple or the pear. For that reason it is planted in the orchard at an earlier age than either. Yearling peach trees are considered more satisfactory by orchardists than older trees. These young plants are usually reduced to a single stem or whip at planting time, the head being formed from the shoots which develop along the body of the tree during the first year of its growth. It is an easy matter to go over the newly planted tree and rub off such shoots as are not desired.

FORMING THE HEAD.

Practically the same rule that holds for forming the head of the apple and the pear is adhered to in forming the body branches of the peach, three or four being the number most frequently used. These shoots are, at the close of the first season, shortened back to about 1 ft. in length, and are allowed to divide into three or four branches during the next season's growth. The same heading back and multiplication of the branches take place the next year. At planting time, however, the main stem of the tree, which carries the roots, but no lateral branches, is seldom more than 2 ft. in height, so that, when the framework branches develop from it, the head of the tree is not more than 18 or 20 in. from the ground. This arrangement enables workmen standing upon the ground to gather the fruit during the first three or four years of the fruit-bearing period. As the tree grows older and the branches become longer, it is neccessary to employ picking stands of some description. The best growers, however, symmetrically shorten the annual growth of all their orchard trees.

SHAPE OF THE TREE.

Ordinarily it will be found most satisfactory to prune the peach so as to make a broad, round-headed tree rather than a pyramidal or vase-shaped tree. In certain localities, the vase-shaped tree may be found the most desirable, but, as the fruit is always borne on the outside, or upon the new wood of the tree, it is in a position to receive full sunlight, and the open-headed, vase-shaped form is, therefore, léss desirable than in the case of fruits which are borne well inside the tree.—"Fruit World."

THE PREPARATION OF RAISINS.

The Muscatel is the most suitable of all grapes for raisins, as this kind gives the largest production and best quality; but other varieties are also successfully used—*e.g.*, Sultanas, Rosaki, Zibibbo, Malaga. The bulk of the fruit for making raisins grows in the coastal regions of the Mediterranean. Stocks of some of the above and other varieties have been imported by

the Agricultural Department, and cuttings are obtainable at most of the Government Gardens.

Some useful information on this subject, from which the following is mainly taken, was published in the Bulletin de l'Office de l'Algerie for July, 1902, and quoted in the "Agricultural Gazette" of New South Wales for December, 1902.

Apparatus required: A brick stove, containing a galvanised or cast-iron boiler, to hold, at least, 40 to 50 gallons; galvanised iron sieve, to hold 8 to 13 okes of grapes; a smaller sieve for skimming the lye; twelve baskets for transport of goods after dipping; a tank of lye; a sufficient quantity of reeds to be used in drying; some small wooden blocks about 2½ in. square, suitable baskets for holding the dry grapes; and an ample supply of pure water should be at hand.

The preparation is thus described: Prepare the lye in an open tub, in which have been placed 75 per cent. of wood ashes to 25 per cent. of powdered quicklime. These should be well stirred and mixed. Pour pure water over this, which filters through the mixture, and should be drawn off through an opening at the bottom of the barrel. This liquid, at the first passage, gives a superior kind of lye, which is re-heated and preserved in airtight vessels. Water can be added twice successively to this mixture. Place the baskets in rows of five, one on top of the other, separated by the wooden blocks at each corner, to prevent the grapes on the top row touching those below, and also to facilitate ventilation.

The boiler having been filled two-thirds with water, add 25 per cent. of the lye of the last filtration (this being the weaker solution), and then light the fire. As soon as the mixture shows signs of boiling, skim it free from all scum, and then immediately plunge the galvanised iron sieve, filled with the least ripe grapes, on the boiling liquid, where it should remain only two seconds. Then examine the grapes. Small holes, like pin-pricks, should be seen on the more tender berries when slightly cooled. If the berries show large slits, the lye is too strong, and should be diluted. If the berries show no signs at all, then add a little of No. 1 lye. The berries are now taken to the drying apparatus, and spread out bunch by bunch. They should be turned after three days, and, at the end of another three days, part of them will be converted into raisins. Those now found too tender are put aside. When the grape becomes like paste when touched with the fingers, the work is finished, and the raisins are taken to the store-room, where they are picked and sorted.

The foregoing is a general description of the process as usually carried out, but small differences of treatment are practised in different countries. For instance, in Sicily, the mixture is $\frac{1}{5}$ quicklime and $\frac{4}{5}$ wood ashes, passed through a sieve. The grapes, when removed from the boiler, are suspended on rods to dry in the sun in the open air; sometimes on wicker trays supported on rods. The drying period is from about six days in the Ionian Islands to fifteen days in Sicily, and varies according to the weather. The raisins are packed, in Sicily, in 11, 22, or 33 lb. cases.

At Smyrna, the usual practice is to scald the fruit in a light solution of soda, generally made from wood ashes, with a small addition of olive oil. They are then spread on the bare ground or on a cloth. They are packed in boxes of 22, 33, 44, or 66 lb.

It should be remembered that, to make a good table raisin, the grape must be grown to perfection, and picked when just ripe. It is as useless to hope to make a good raisin from an inferior grape as to make "a silk purse out of a sow's ear." It is largely owing to acting on the belief that inferior

grapes will do for converting into raisins that the Cyprus production has hitherto failed to find a steady and profitable sale in Europe. The process is not difficult or costly, but unless all damaged or hard and unripe grapes in a bunch be cut out the price will be determined upon the value of the worst grapes, however well the preparation may have been made.—"Cyprus Journal."

LUTHER BURBANK'S LATEST CREATIONS IN FRUITS.

We have received from Mr. J. M. Rutland, of Kiewa, Victoria, a pamphlet illustrating and describing eight new plums, the very latest and best of Mr. Burbank's creations. That gentleman has sold all his rights in these particular fruits to Mr. Rutland for the Southern Hemisphere and for Africa. Mr. Rutland, who was fruit-growing close to Mr. Burbank's experimental farm, at Sebastopol, California, had every opportunity of thoroughly testing the fruits from the original trees. He gathered the scions as Mr. Burbank cut them from the trees, and brought them over from America, consequently he is able to guarantee them true to name. The illustrations are beautifully coloured and give a perfect idea of the appearance of the fruit. The following are the names given to these plums by Mr. Burbank :—

Plumcot Rutland.—This is a cross between the plum and the apricot—a feat deemed impossible a few years ago. Mr. Burbank does not by any means consider this a perfect fruit, but it possesses some very strong points of special interest to fruit-growers. For instance, although not a heavy bearer, it produces fine large fruits in liberal quantities every year where apricots fail, thus, to a great extent, increasing the area for that fruit. It is an unusually early fruiter. One of its striking features is its brilliant red flesh possessed of a strong sub-acid flavour, rendering it a favourite for cooking as well as for jellies and jams. The fruit is about the size of an ordinary apricot. It will commence to ripen at the beginning of December, and a continuous crop may be gathered during the month.

Santa Rosa Plum.—This is one of the best plums which have come from Mr. Burbank's hands. It has never failed to produce bounteous crops of uniformly large, uniformly perfect fruits of a deep purplish, crimson colour, averaging 6 in. in circumference each way. It is a good grower, good bearer, fine shipper, good keeper, and in every way a money-maker. It is a medium early bloomer. The flavour of the plum is rich, fragrant, and exquisite. It ripens with the earliest, nearly a week before Climax and Red June, and two weeks earlier than the Burbank. Mr. Burbank says that, in favourable situations, the tree will yield 50 lb. of fruit when it is three years old. It will keep in hot weather for a week after it is ripe, so that there is no occasion to pick it half-ripe in order to ship.

Formosa Plum.—An unusually handsome fruit which blends probably fifteen to eighteen varieties in its origin. It grows with remarkable vigour, often before commencing to bear, 10 to 12 ft. in a single season. No disease has ever found lodgment with the Formosa. The fruit is of uniform size, averaging 6 in. in circumference each way, of a rich yellow with a pale bloom till nearly ripe, then turning to a clear red, nearly freestone, with a delightful apricot flavour.

Gaviota Plum.—A cross between Americana and Japan. One of the very best of table and shipping sorts. A very handsome cherry-red fruit, over 2 in. in diameter. The stone or "pit" is so small that it only constitutes $1\frac{2}{5}$ per cent. of the fruit, being, in fact, almost seedless. It is a late bloomer.

Rubio Plum.—This is one of the best of Mr. Burbank's creations, in fact, the best blood plum in existence. The flesh is deep crimson when ripe, and the juice runs out like blood. An early and abundant fruiter.

Ballena Plum (The Whale).—The largest plum in existence, and a prodigious bearer. A seedling of the "Bartlett." The fruit resembles, in shape, a huge well-fattened almond, averaging 6 by 9 in. in circumference. Colour light yellow. Freestone. Never fails to produce a full crop.

Hermosillo Plum.—This is the earliest plum in the world, ripening on young transplanted trees a week before cherry plums. The size is twice as large as cherry plums. The skin is tough, the flesh firm and crimson.

Madeira Plum.—This plum was called "Cantaloupe," on account of its resemblance in flavour to a Cantaloupe or rock-melon. A delicious plum for eating, and should do well in warm climates, but is somewhat subject to rot in damp seasons.

All the above varieties can be obtained from Mr. Rutland at 10s. each; but the season is now almost too advanced for planting, as the trees are ready for removal in May and on to July. They cannot be obtained from our nurserymen, as all orders must go direct to the nurseries at Kiewa, Victoria.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1908.						1909.						
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.
North.													
Bowen	0·88	0·51	0·96	2·47	0·42	0·42	15·48	4·52	1·06	1·15	2 32	1·98	1·23
Cairns	3·70	2·12	0·74	3·07	1·60	1·41	32·05	5·25	21·03	14 19	1·06	2·48	0·65
Geraldton	8·11	3·66	2·81	6·93	3·80	1·69	47·92	10·29	37·31	28·51	5·98	9·13	6·53
Gindie State Farm ...	0·40	1·27	..	...	...	...	...	..	...	...	..	...	...
Herberton . ..	2·36	Nil	0·51	1·27	0·61	0·78	12·41	2·28	3·52	0·70	0·81	1·22	0·20
Hughenden ..	0 68	Nil	Nil	1·67	1·94	1·05	7·55	1·55	2·86	...	Nil	1·71	1·37
Kamerunga State Nurs.	4·85	1·58	..	3·64	1·69	...	...	3·52	...	4·95	0·97	...	...
Mackay	1·65	0·71	2·27	1·80	2·57	0·02	15·00	1·36	9·00	2·59	2·33	2·05	4·00
Rockhampton	1·08	0·84	0·20	2·14	2·47	1·37	9·01	2·01	1·68	1·21	0·03	1·33	2·99
Townsville	1·70	0·27	0·28	1·58	1·26	0·07	6·94	1·70	7·01	1·28	1·07	1·51	0·83
South.													
Biggenden State Farm	0·49	2·33	1·39	1·80	2·12	3·66	7·37	2·68	2·45	2·00	0·72	2·60	4·01
Brisbane	0·77	2·83	0·67	1·77	2·25	1·28	1·99	2·72	2·65	4·67	0·82	1·75	2·10
Bundaberg	0·75	1·56	1·10	2·39	0·73	3·34	6·52	3·70	5·06	1·54	0·67	1·51	5·65
Dalby	0·14	1·80	1·13	2·55	3·63	1·56	1·46	3·55	0·99	1·60	Nil	1·87	1·19
Esk	0·46	2·75	2·16	1·29	5·99	3·62	2·64	3·21	3·27	5·03	0·36	2·43	2·74
Gatton Agric. College	0·6	2·71	1·84	1·93	5·71	1 29	1·94	5·00	3·18	3·82	0·32	1·22	2·02
Gympie	1·16	2·87	1·37	2·49	2·58	3·97	3·86	3·77	3·41	2·34	1·15	2·96	4·70
Ipswich	0·47	3·23	1·19	1·48	5·09	1·05	1·37	1·95	2·66	4·56	0·05	1·31	1·67
Maryborough	0·81	1·98	1·05	1·84	1·92	1·64	8·36	7·11	2 28	2·4	0·91	2·57	5·02
Roma	0·63	1·38	1·12	2·15	2·79	1·68	5·19	4·85	4·18	1·91	0·44	2·73	1·54
Roma State Farm ...	1·27	0·73	...	...	...	...	...	...	...	...	...	...	...
Tewantin	1·97	2·70	2·18	2·30	7·50	4·12	6·44	3·31	4·34	9·37	1·00	3·24	4·08
Warwick	1·24	2·99	1·96	0·96	5·28	2·02	0·87	0 82	1·30	2·21	0·70	1·23	2·04
Westbrook State Farm	0·49	1·97	.	...	2·05	...		2·61	1·43	...	...	...	...
Yandina	2·64	2·18	1·50	3·10	6·03	2·75	6·69	6·42	3·71	5·25	1·10	2·70	3·70

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND,
Divisional Officer.

Horticulture

FLOWER GARDENING, No. 20.

PLANTS SUITABLE FOR OUT AND IN DOOR CULTURE.

BY THE EDITOR.

CONCLUSION.

Before concluding this work, I must say a few words about the cultivation of

AQUATIC PLANTS.

There are many aquatic plants which are very ornamental in a garden that has water in the shape of ponds, or waterholes, natural or artificial. Most of them are very easy to grow, especially those belonging to the order Nymphæaceæ. Some of the small species may be grown in large earthen vessels sunk to the rim in the earth, and kept filled with water. These, when properly attended to, have a very pleasing and refreshing appearance especially if in some situations near the house, surrounded by potted plants of different kinds. My friend "Hortulanus," whose writings I have much availed myself of, says, concerning aquatic plants:—

The growing of aquatic plants is a most interesting phase of horticulture, but very few people have the facilities for engaging in it, in a dry climate like this. Where water is available for a small pond many beautiful kinds of lilies can be grown. Nymphaeas are a variety most suitable for this purpose, and a number of plants may be grown in a small pond, as they do well in a confined space; in fact, they can be successfully grown in tubs. Nymphaeas may be propagated by divisions of the plant or from seed. Raising them from seed is a very easy operation. Take a saucer and three parts fill it with equal parts of leaf mould and sand, then mix the lily seed with fine sand, and sprinkle it over the surface of the soil in the saucer. Before sowing the seed make the soil in the saucer very wet, but do not cover with water until the seed has been sprinkled over it. After sowing carefully submerge the saucer in a pan of water, just covering the top of the saucer with water, and place in a warm, sunny place. When submerging the saucer do it gently, so as not to disurb the seed, which is exceedingly small. Keep the water level with the top of the saucer or about 1 in. over the top of it, but take care when adding the water the soil is not disturbed. A good plan is to syphon it in with a small piece of rubber tubing. In a few weeks the plants will make their appearance, looking just like little green hairs. A small, round, green leaf will soon form, and when two or three leaves have formed the plants are large enough to transplant. Take the smallest sized thumb pots, place a layer of old rotted cow manure at the bottom, then fill with equal parts of sand and leaf mould. Lift the young plants carefully and plant in the pots, covering the roots with soil, and place pieces of broken crock or stones over the surface of the pot to anchor the young plants. Place the pots in a large receptacle, and fill with water until the young leaves are extended to the length of the stalks. Keep on adding more water about every second day until the receptacle is full. The plants can be left growing in the pots until they have made strong plants with plenty of roots. They may be transplanted into the tubs or ponds by simply knocking them out of the pots in exactly the same manner as repotting any other kind of plant. If grown in tubs 18 in. of leaf mould should be placed at the bottom; as the plants like a rich soil, one-third of well-rotted cow manure may be mixed with the leaf

mould, but to make sure that the cow manure does not injure the young plants pour off the first or second waters before planting. If grown in ponds at least 2 ft. of prepared soil should be placed at the bottom. When planting out the young plants anchor them with stones or coarse sand.

VARIETIES.

Nymphæa alba: A lovely white water-lily with large fragrant white flowers. Blooms in profusion during Summer and Autumn. *N. gigantea:* A beautiful blue variety, a native of Queensland, growing in many of our streams and lagoons. *N. coerulea:* This is also a very fine blue lily. *Nuphar lutes* (the yellow water-lily): The flowers are clear yellow, like an immense butter-cup. *Nelumbium speciosum* (Egyptian Lotus): Flowers pink. *Aponogeton distachion* (the fragrant Cape Water-lily): This variety has curious, large white flowers, with dark anthers, scented like the Hawthorn. It is very easily cultivated. *Cyperus alternifolius* (the Paper Grass): This is more generally grown in the bush-house than in the water. *Cyperus papyrus,* or *Papyrus antiquorum,* is the Egyptian Papyrus from which the paper of that ancient people was prepared. It grows to a height of 8 or 10 ft., and is propagated by division of the roots. *Pontedera* (Water Hyacinth)—*P. crassipes:* This is a very beautiful flowering water-plant, producing flowers much resembling the iris, of a beautiful soft, lilac-rose colour, the upper petals showing a curious blue blotch. So well does this plant thrive in this State that it has become a perfect pest, completely blocking up the upper reaches of rivers and creeks, and thus entailing great expense on the shire councils to eradicate it. In Florida it has completely taken possession of some rivers, causing serious obstruction to navigation. I strongly advise those who possess ornamental waters to rigidly exclude it therefrom.

VICTORIA REGIA.

This is one of the most remarkable productions of the vegetable kingdom. It is indigenous to South America, chiefly Guiana, being found in marshes and slow waters. It has been successfully acclimatised in the Brisbane Botanic Gardens. Of this there are two species, one growing in the slow streams and lagoons from British Guiana to the Amazon region, and known as *Victoria regia:* the other a native of similar habitats in Paraguay, and called *Victoria Cruziana,* or usually by the much more recent name of *Victoria Trickeri.* The latter, being from a more southern region, and hence cooler, is much easier to grow than the former. For success with *Victoria regia* a temperature of from 80 to 90 deg. must be maintained. For *Victoria Cruziana* success may be assured with a temperature considerably below this, but even then a little heat early in the summer, particularly if several days of cool weather occur, does not come amiss, and your plant will respond gratefully to this little attention. A noticeable difference in the two species is to be seen in the leaves. Those of *Victoria Cruziana* show the upturned margin, the unusual feature, almost as soon as they expand from the bud, even very young plants exhibiting this peculiarity. In *Victoria regia* the plant must have attained considerable size before this feature is in evidence, and each new leaf is slower in showing this development. For general purposes, therefore, it is better to choose, at least for the first experiment, *Victoria Cruziana.*

In its natural state the Victoria is a perennial, existing for several years. It thrives in 3 to 4 ft. of water with rich loose mud, and rapidly attains maturity. When in full vigour it bears, in quick succession, as many as eight or ten of its enormous leaves at a time. Each of the leaves measures from 5 to 6 ft. in diameter, with an up-turned margin of about 3 in. The upper surface is of a deep brilliant green, the underside of a crimson tint and furnished with strongly developed veins which are remarkable for their intercellular air spaces, and form a regular and elegant network. The thick

leaf-stalk is from 6 to 7 ft. long and hollow in the centre, so that it can be extemporised into an effective syphon. The underside of the leaf, as well as the petiole and stalk of the flower, is covered with very sharp formidable spines, which, however, are not proof against tortoises. The peculiar formation of the under surface of the leaf imparts to it great buoyancy, rendering the mature leaf capable of bearing a considerable weight, if evenly distributed. Children have sometimes been photographed on the leaves representing a weight of over 150 lb.; it has been recorded in America that one leaf sustained a weight of 250 lb. The flowers are not less interesting than the leaves; when expanded, a bloom measures from 12 to 15 in. in diameter, the numerous petals suggesting a plume of lovely white cock's feathers; at first pure white, it passes by successive shades, the second day, into a rosy hue. Only one flower on each plant opens at a time, and this is always at dusk. It exhales a strong, pleasant odour, not unlike that of a rich pineapple; this is distinctly perceptible as soon as the sepals show signs of bursting, and long before the flower is fully open. The bloom lasts but two days, or, more correctly speaking, two nights and a day, and is succeeded by a seed pod as large as a child's head. The farinaceous seeds afford a nutritious article of diet to the natives of Guiana, who call it "Mais del Agua" or Water Maize.

APPENDIX.

To Protect Seeds from Birds.

There is no horticulturist who has not experienced the disappointment of having his seeds eaten either by birds or insects. A Belgian horticulturist claims to have discovered a sure and inexpensive way of preventing such depredations. Just before sowing, he says, shake up some powdered red minium with the seeds. Red minium is a poisonous salt of lead, but is not dangerous to handle. Either its taste or its smell prevents the seed being touched by any insect or bird. Crystals of naphthaline are said to give equally good results.

The most effective bird-scarer I have ever tried is made as follows:—Run a piece of black cotton through a potato. Stick a number of wing feathers of a fowl into the potato, and hang the contrivance to a stake placed sloping in the ground. The least breath of wind sets it in motion, and sparrows and other bird pests give it a wide berth.

A new bird-scarer has lately been placed on the market, which explodes crackers at certain intervals which may be regulated by the gardener. It continues its action for twenty-four hours without any attention.

To Keep Cut Flowers.

There are flowers which will last a considerable time when cut and placed in a vase of water. Again, there are some of the most beautiful blooms which fade away within twenty-four hours. Various means have been suggested for the preservation of cut flowers, amongst which it has been recommended to take the flowers every morning from the vases, refreshing the stems by a few minutes' bathing in fresh water, and then sprinkling the blooms lightly with the hand. The water is to be changed every day. Sunshine is very injurious if allowed to rest on cut flowers, and gas saps the very life of delicate blossoms. If flowers are cut before the sun has gained power, and placed in tepid water, they will last for forty-eight hours. Nasturtiums, heliotrope, and, above all, roses should be gathered at night, if possible. Their stems, and those of all flowers kept in water, should be cut daily. The wistaria is a very perishable blossom, that seems to pine away when transferred to the house, but the Japanese have conquered this propensity by the most heroic treatment. They burn the stems of the flower, and then immerse them in spirits.

Other woody plants, like the Hydrangea, Jacaranda, &c., can be treated in the same way.

TO PRESERVE FLOWERS.

To revive flowers which have become somewhat faded and tired, put them into hot water. Hot water, from 90 deg. to 110 deg. Fahr., is the best pick-me-up for flowers which have travelled some distance.

A spray of arranged flowers should be kept on a piece of damp cotton-wool under a basin. This treatment excludes the air, and preserves the blossoms. The delicate fronds of ferns can be kept quite fresh in this way. To thaw frosted flowers, immerse them deeply in cold water.

To keep a button-hole flower in good condition, burn the ends of the stems, or close them with sealing-wax. This prevents the sap from escaping, the flower keeping fresh so long as it has sap to feed on. Floral decorations, which must be kept in a certain position, may be preserved by using damp sand sprinkled with sulphate of ammonia.

Flowers should on no account be allowed to lie about without being put into water, as they lose vitality every minute. Allow cold water to run freely over their stems, removing any decomposed matter that may be adhering to them. Be careful not to allow the water to touch the petals.

Flowers put in water at once will last twice as long as those allowed to wilt for an hour. Flowers with woody stems should be stripped of their outer coverings of bark, and the end of the stem split up to allow of their taking up water freely.

The flowers should never be crowded together, and a small bit can be cut off the end of the stems, adding a little charcoal each time the water is changed.

A very good way to preserve a single bloom is to cut the stalk neatly and evenly across at the length required, then insert it into a piece of potato, turnip, or similar root of any kind. A bloom will in this way absorb sufficient moisture and nourishment to keep it in a fresh state for some time.

Some flowers have a tendency to fall to pieces more readily than others just after they have been opened. Such a defect may be obviated to a great extent by dropping a little gum arabic or thin glue around the base of the petals of each flower.

To preserve a bouquet, first sprinkly lightly with fresh water, then put it into a vessel containing soap-suds. Take the bouquet out of the soap-suds every morning, and lay it sideways into clean water, keep it there for two minutes, take it out and sprinkle the flowers lightly with water. Replace it in the soap-suds, and it will be as fresh as when first gathered. The suds should be changed every three days. If carefully treated in this way, wedding or other bouquets may be kept bright for at least a month.

HOW TO PACK FLOWERS FOR POST.

During the flowering season above the Main Range, especially on the Darling Downs, many people send boxes of beautiful and exquisitely-scented European flowers to the coast towns, and it would be well if amateur gardeners would study the art of packing them for the journey, so that they may arrive in good condition. Many a box have I seen, full of violets, crushed, and partly destroyed, by the final watering considered essential before finally closing the parcel. If blooms are packed into a box carelessly, with a cabbage leaf beneath and above them, and then dowsed with water, with the idea of keeping them fresh, by the time that they arrive at their destination, after the rough handling they usually receive in the guard's van, the greater part are destroyed, and the remainder look like the "Last Rose of Summer"—faded and gone. Flower-packing is an art well understood by florists, as is seen by the exquisite blooms in the Brisbane florists' windows. Many of these have stood a journey from Sydney, and even from Melbourne, yet they look as fresh and delicate as if still growing on the plant.

The best travelling box is one made of tin, but strong cardboard boxes will do on emergency. Line the box with white paper. Cut the flowers early in the morning—never in the afternoon. Lay them in the box, one by one, filling up the whole space; if they do not fit into the corners, stuff the latter with soft tissue paper. Do not sprinkle any water on them, but cover with a few fern leaves, and over these place a sheet of damp cotton wool. The flowers will travel safely, provided the train and post office officials are careful. To avoid accidents, label the box in clear large letters, "Cut Flowers." The recipient of flowers thus packed will find no damaged ones in the parcel. A few years ago, a box of magnificent "Queen of Edgely" roses was sent as a Christmas present to Her Majesty Queen Alexandra from Philadelphia. They travelled by the ss. "Lucania," and a week after their arrival in England were still bright and fresh. The roses were 8 in. in diameter, with stems a yard long. The ends of the stems were placed in long glass phials, filled with water, and capped by rubber, fitted closely round the stem. The opened buds were wrapped in wax paper to exclude the air, and then the roses, stems and all, were buried, each by itself, in soft moss, damped, and packed in cracked ice. The box was then sealed in a strong box, and placed in the ship's cold storage room. On opening the box, it was found that the buds had burst into full bloom, and were entrancingly beautiful and fragrant on Christmas Day.

LABELS.

Labels may be made either of wood or zinc. The latter are preferable, owing to the liability of wood to rot in the ground, and to the attacks of white ants. Wooden labels can, however, be preserved by soaking them in a weak solution of creosote. Large labels may be painted white, and the points dipped into boiling tar, and afterwards sprinkled with dry sand or coal ashes. Another good remedy is to soak the labels in a solution of sulphate of iron, allow to dry, then soak thoroughly in a strong solution of lime water. The insoluble sulphate of lime thus formed in the tissues of the wood prevents rotting.

INK FOR ZINC LABELS.

Take 1 part sal ammoniac, 1 part verdigris, ½ part lamp-black, and 10 parts of water; mix thoroughly together, and keep in a glass-stoppered bottle. Shake before using; write with a J pen. Another useful ink is made by dissolving half a teaspoonful of sulphate of copper in a small penny writing ink bottle.

LIQUID MANURE.

There are various forms of liquid manure, applicable in their use, to different classes of plants. Perhaps the best, most simple and most easily procured is made by taking one kerosene tin full of fresh cow or horse manure (cow preferred). Put this in a bag, and suspend in a barrel containing 30 gallons of water. Keep this stirred frequently for a week, and let it settle. When clear, 1 quart of liquid to 2 gallons of water will be sufficient to use.

The drainings of stables and cow-houses afford ample supplies of liquid manure. A good proportion for diluting the drainings is half-and-half. Another form is oil-cake stirred into a vessel containing a mixture of dung and water. The mixture is left to ferment for three or four weeks before using it.

Sulphate of ammonia, ½-oz. to 1 gallon of water, is useful. It should not be mixed with lime.

All liquid manure must be given in a weak state. The gardener must consider for what purpose he is using it, whether for foliage or for flowers; for, if used to excess, the former will be at the expense of the latter. For plants like pelargoniums, zonales, cinerarias, petunias, calceolarias, and some other soft-wooded plants, once a week will be ample, until such time as they show their bloom buds, when the manure may be applied twice a week, easing off as the flowers expand, and ceasing altogether when the plants are going

to rest. Never apply liquid manure to newly-potted or dormant plants, especially in the winter time.

Many green-house plants, such as palms, aspidistras, &c., that have become pot-bound, will be greatly aided by a judicious application of manure in a liquid form when they are starting to grow.

Soot makes an excellent fertiliser. This may be prepared by putting a couple of gallons of soot (in a bag) to the same quantity of water as above, using 1 quart of the liquid to 3 gallons of water. This manure produces fine dark foliage, and may be given to almost any plant requiring a stimulant without fear of injury.

COMPOST FOR POT PLANTS.

A compost in which almost any plant may be grown to perfection, can be formed of well-rotted turves, cow-dung, and peat; a little silver sand being added, if not sufficiently open, and for such plants as require a sandy soil. The turves should be cut with a sharp spade, not more than ½-in. thick, where the grass forms a compact sward. These should be thrown into a heap to decay, and should be turned over about every three months. In from six to twelve months the heap will be broken down into a lumpy soil, very rich in vegetable matter, and will be fit for use.

The cow-dung should be placed in a heap, kept wet, and turned over frequently while decaying, as it deteriorates greatly if allowed to over-heat, which it is liable to do. If properly attended to in this respect, it will have become an unctuous black mould in about six months.

If peat cannot be obtained, a good substitute will be found in the great old roots of the stag-horn and elk-horn ferns which grow abundantly in the scrubs. The materials being thus provided, they may be thoroughly mixed in the following proportions:—Loam from the rotted turf, 2 barrowfuls; cow-dung, ½-barrowful; peat, ½-barrowful.

Certain modifications of this soil will be required for plants of a very different nature. Some, for instance, delighting in a sandy soil, will need the addition of more sand. Others, on the contrary, which need a rich, rather stiff loam, like the rose, would not require any sand, and might do without the peat.

LIVING BAROMETERS.

Among the best of the living barometers are snails, which do not drink in the ordinary sense of the term, but absorb moisture during the wet weather, directly through the skin, and exude it afterwards. As they are anxious not to have the moisture evaporate too quickly, thus creating a premature thirst which cannot be conveniently satisfied, they keep, during dry weather, in strict seclusion, moving abroad only during or just before rain. Immediately before a downfall, they may be seen climbing the trunks of trees and busily getting in amongst the leaves. Gnats assemble in clouds under trees, and horses grow restless. Swans, where they are plentiful, may be seen flying against the wind. Spiders on the walls, toads coming out of their holes; ants rise up the walls higher than their dwelling places; and pigeons may be seen going to the dovecotes earlier than usual.—"Gardener's Magazine."

JADOO FIBRE.

Some nine years ago the subject of Jadoo fibre created considerable interest amongst horticulturists in this State, and we believe that the principal Brisbane nurserymen imported some. Like all new ideas, however, the interest died out, and since then nothing has been heard of Jadoo in Queensland.

Jadoo was discovered by Col. C. Halford Thompson, R.A., of Teignmouth, Devonshire, and was introduced into Victoria in 1896 by Mr. W. R. Virgoe, as agent for the company in England. When it was brought to Queensland by the late Mr. Reginald Finlay, then manager of the Queensland Investment Company, a portion was supplied to the Department of Agriculture and Stock,

and passed on to the Queensland Agricultural College for experiment in 1899. An exhaustive analysis of the fibre was made by Mr. J. C. Brünnich, Agricultural Chemist, in order to see if what the inventor claimed for it was really true. (For the Analysis, see "Q.A.J.", December, 1899.)

The conclusion arrived at by Mr. Brünnich was, that he found Jadoo to be a fine, fibrous product, of brownish colour, almost like a sponge, which has the power of absorbing an enormous quantity of water, up to six or eight times its own weight. This fact alone would explain part of its practical value, when used for pot plants, or in the orchard or vineyard. This fibrous raw material is saturated with plant foods, which, according to analysis, are, to a large extent, soluble in water, any plant having thus a fair amount of plant foods at once available for its growth. Another portion of the plant food is like some in ordinary soil, not soluble in water, but soluble in hydrochloric acid, and then becomes available gradually, by the chemical dissolving action possessed by the roots of growing plants. As a matter of fact, Jadoo fibre must be considered a highly fertile, artificial peaty soil.

Jadoo is by no means a manure; and, according to the analysis, the actual value of the plant food, phosphoric acid, potash, and nitrogen amounts to 15s. per ton of Jadoo fibre. The secret of the preparation lies in the foundation material, which has the power of absorbing and retaining the fertilising ingredients, which are thoroughly incorporated with the fibre by a slow process of fermentation.

In October, 1898, we published an article on this material, in which we expressed our ignorance of its characteristics. This brought the following information from Mr. Virgoe, in February, 1899:—

"In your article on Jadoo, you say 'you do not know what Jadoo really is.' I did not until this last month, but I am now in possession of the detail of the process of manufacture, which I now give for your information, omitting the exact proportions of the ingredients, which, however, I am willing to also furnish, if desired. Jadoo (pronounced Jah-doo) is, I understand, an Indian word, meaning 'magic.'

"Now, as to its *not being a manure*, owing to my assertion to that effect, I have great difficulties with the Customs in South Australia and Western Australia, as on that ground they have imposed a 15s. duty, which I am trying hard to get removed, and, as you will see by the particulars herein, I think it must be deemed a manure At any rate, I shall for the future call it a fertiliser.

"The foundation of the Jadoo fibre is absorbent peat moss, a small sample of which I send you under separate cover.

"In a large boiler partly filled with water the following ingredients are put in various proportions:—

"Soot, pink gypsum, bonemeal, phosphoric acid, potash, nitrate of soda, sugar.

"The boiler is then filled up with the peat moss in a dry state, and the whole is kept at boiling-point for thirty minutes.

"The mass is then taken out and stacked. To it is added yeast, and the mass is fermented, and kept in that state, and at a certain temperature for a month or five weeks, when it is fit for use.

"The Jadoo liquid is made in the same way, but without the use of the peat moss.

"The Jadoo Company admit that Jadoo is still only in its infancy, and that scientific research may vastly improve it."

TO RENOVATE JADOO FIBRE.

Jadoo can be used many times over; in fact, it has not yet been ascertained when it becomes exhausted. When taken from a pot, all that is necessary is to spread out the fibre in a box, and expose it to the air for a few days to

sweeten it; then water it with liquid Jadoo at a strength of 1 in 20 of water until sufficient moisture has been absorbed to restore it to its original weight (about 35 lb. per bushel). It may then be used as at first. With Jadoo, remember these points:—

Thoroughly disintegrate the fibre, leaving no lumps.

Use in a moist state. Pot firmly. Don't over-water.

Always use pots two sizes smaller than required for soil, but if soil and Jadoo are used in conjunction, then, a pot one size smaller may be used.

The "Australian Gardener" (1st June, 1909) writes as follows on this remarkable fibre:—

Jadoo.

An Excellent Fertiliser.

This marvellous fertiliser was discovered by Col. C. Halford Thompson, R.A., of Eastcliff, Teignmouth, Devon, as the result of years of experiment in his own gardens. Its action in stimulating the growth of all plants was so surprising that he gave it the name of "Jadoo," a word formed from a Persian word meaning magic.

The results of its use are so astonishing that something more than chemical analysis must be employed to explain it, and probably the reason is to be found in bacteriology, when an action, somewhat similar to that of leguminous plants, in storing up nitrogen in the soil, abstracted from the atmosphere by bacilli, will most likely be ascertained.

At first used to replace earth in the potting of hot-house plants, its use has extended in a marvellous manner, and from being a light, clean, and convenient medium for window gardening, hanging baskets, and the hot-house cultivation of ferns and flowers in pots, it is destined to become universal as an agent in stimulating and fostering the growth of every description of plants, from the humble cabbage to the lordly oak.

Jadoo is not a manure. It is a special fertiliser for all kinds of plants, and can be used alone for potting and hot-house use. It is, then, a substitute for earth, a material in which not only one, nor twenty, but every variety of plant will grow more rapidly, produce finer blooms and foliage, remain in more uniform health, and require less care and attention than when planted in soil.

Experiments have been made with almost every known species of plant, tobacco, and vines, many vegetables, and some varieties of trees; and in every case the improvement in the condition of these plants was so marked as to need no pointing out.

One remarkable feature of Jadoo fibre lies in the fact that plants grown in it may be transplanted, with practically no danger of flagging.

Directions for Use.

When using Jadoo for plants in pots treat it in exactly the same manner as you would earth. The only thing to be taken care of is, that the Jadoo is pressed tightly around the plant. Water the plant well, directly after potting. Don't overwater afterwards. In sowing seeds and planting cuttings in Jadoo an even surface must be obtained by sifting the Jadoo, or by putting a little fine soil or sand on the top of it.

Jadoo Liquid.

Jadoo liquid is a highly concentrated solution of the elements which enter into Jadoo fibre, the proportion of these elements being slightly changed. It is used diluted in water in the proportion of 1 part Jadoo liquid to 20 to 48 parts water, according to circumstances. Its composition never varies, thus avoiding all possibility of mistakes in its use. Jadoo liquid revives drooping plants, strengthens the weak, and nourishes the strong. Above all, it increases the size, causes greater profusion of bloom, and heightens the colour of all flowers.

Natural History.

THE WHITE ANT CITY.

In the beginning of this year, a German scientist, Mr. Frederick Suck, of Hamburg, invented an ingenious instrument, by means of which the presence of white ants and other boring insects in trees or buildings may be detected when there are no outward and visible sgins of their secret destructive work. This instrument appears to be a combination of the microphone and telephone connected by a wire to a rod. When it is desired to ascertain the whereabouts of termites in the soil, the rod is passed into it, but should the probable location be a tree or piece of house timber it is sufficient to place the point of the rod against the suspected spot. It appears that the gnawing of the ants is then transmitted through the microphone to the telephone held to the ear. Those who have had an opportunity of testing the powers of the microphone will know how the smallest sound, quite inaudible to the unassisted ear, is magnified to such an extent that the footfall of a fly or even of a mosquito is as distinctly heard as that of large animals.

In connection with the work of the destructive termites, a very interesting paper on the "Study of White Ants," written by Walter W. Froggatt, F.L.S., Government Entomologist of New South Wales, was published in the August number of the "Agricultural Gazette of New South Wales," 1903. The article was excellently illustrated, and we are indebted to that journal for being enabled to reproduce them in this issue of the "Queensland Agricultural Journal." The life history and operations of these so-called "ants" is intensely interesting, as will be seen on perusal of Mr. Froggatt's paper. He writes:—

Most people have heard of white ants, but it would probably be difficult to describe one, or say in what way they differ from black ants. Now, like many other names which have crept into common use, from a naturalist's point of view, this term is very misleading, for these insects are in no way related to the ants; but a popular name always sticks, so "white ants" they will remain to the end of the chapter.

The white ant we are now describing is scientifically known under the name of *Termes lacteus;* the first, or group name, was given to all the white ants by Linnæus, from the Latin word *Termes,* a worm in timber; and, in describing the species, I gave it the second, or specific name, *lacteus* (*lac,* milk), in allusion to the curious habit of the soldier, when alarmed, of discharging a globule of milk-like fluid from the forehead.

If you want to know anything about a thing, the best method is to study it in its natural surroundings, so let us shoulder a pick and axe, and go out into the paddock, and investigate one of the large domed "ants' nests," that, by years of work, these industrious little miners have raised over what was once a dead log. There are many other kinds of white ants' nests, both here and in other parts of the world; some, blackened and rounded masses built in the fork of a dead tree, are known as "negro heads" in the West Indies; others are constructed in hollow trees, under logs, and deep down underground in roots and stumps, some nests containing only a few score inhabitants, others countless millions.

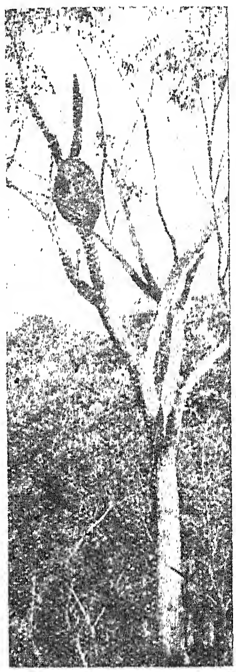
This earth-covered dome, which we are about to open out, is, however, typical of the curious termitaria (otherwise termites' or white ants'

homes), which are found all over the warmer parts of the world, some of which, at Port Darwin, in North Australia, are 18 ft. to 20 ft. in height (also on the coast of North Queensland, in Albany Passage—Ed. "Q.A.J."). Years ago, a pair of winged white ants, flying from an adjoining nest, which had become too crowded to hold them and many thousands more of their brothers and sisters, after escaping their many enemies, tired and worn out, crept under the log and commenced housekeeping on their own account. Their wings had fallen off soon after they alighted, so they could not have gone much further, and would have soon starved to death, but a wandering band of workers and soldiers of their own species came across them and recognised them as relations. They were certainly very unlike each other, for the worker white ants had never possessed wings, but were soft white creatures with broad rounded heads, and a pair of thick-toothed, black jaws hidden under the front of the head, most admirably adapted for gnawing wood; while the soldiers, who did not go in for work, but simply acted as an armed escort for the helpless workmen, were provided with a long pair of scissor-like jaws, projecting in front of an elongated yellow head, with which they could easily snip off the head of any enemy that came across their path. They had also, above the jaw, a little circular hole connected with a chamber in the top of the head, containing a lot of sticky, white fluid, that they could also discharge at will over the top of the fighting jaws, and give their enemy a very bad time indeed. Though both the workers and soldiers were quite blind, it did not matter very much to them, as the whole of their lives were spent in the dark, working under cover, and wingless; but the king and queen, as we will now call the once flying, but now wingless, pair, are provided with a fine pair of eyes, and vary from almost black to chocolate brown in colour. Fired with ambition, this band of travellers forgot all about their old home, and set to work to found a new colony, which in the course of time, from very humble beginnings, after many additions and enlargements, has risen up to the mound before us.

Domed Nest.

This nest is a little over 5½ ft. in height, with a rounded dome-shaped top, swelling out at the base to about 10 ft. in circumference. The outer shell consists of a mantle of solid earth, varying from 18 in. to 2 ft. in thickness on the summit, but much thinner at the base. All this great mass of earth, as it was scraped off the surrounding surface, has been carried up, bit by bit, in the jaws of these busy little masons, and, mixed with a mortar-like excrement that has passed through their bodies, formed into a clay wall that has dried and hardened in the sun. So fine is this clay that in Ceylon the native jewellers use it for polishing their gems; it also sets well, and is often used for making earthen floors in houses in the bush.

Now, we will break a hole in the side on the thinnest part of the outer wall, and expose a portion of the woody mass within, and see what a commotion we have caused. All the workers in the breach rush into the galleries behind for shelter, and the yellow-headed soldiers come hurrying to the front, but, evidently finding the damage more extensive than usual, retreat in good order into the front of the galleries running back into the heart of the colony, where they stand on guard with their sharp jaws projected, and their slender, bead-like antennæ waving backwards and forwards, just touching the comrade on either side. In a very short time you see that there is something going on behind their ranks, and presently out walks a worker bearing a small clay brick in her jaws, which she lays down in front of the opening, pats it down with her head, and then turns round and discharges a drop of ready-made mortar on the top of it. She then backs out, making room for the next one to repeat the process, until, in a very short time, a low rampart is raised in front of the tunnel, and, in the course of a few hours, every gallery facing the hole is sealed up. They appear to know that it is of no use trying to mend the great gap in the clay wall, so they make temporary repairs, and, later on, fill up the gap under cover of the night, for, if you visit it a few weeks later, you will find it patched up with fresh clay, and nicely rounded over. As we now want to examine the internal structure of the nest, we set to work with axe and pick, and soon remove all the clay wall, exposing a smaller domed mound of dark brownish material, honey-combed and folded together in flattened masses with the base buried about 6 in. in the ground, from under which run a few main underground roads leading away out to adjacent stumps and logs.



Negro-head Tree Nest.

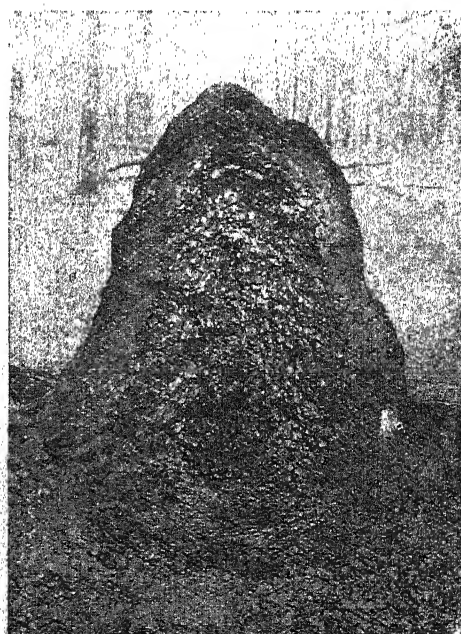
The best method of examination is to get a pole and overturn the nest, cut away the base, which is now swarming with millions of little white ants in all stages of growth, even the large, dark, blackish-winged ones, if it be late in the season, and study the whole in detail. Though the summit and outer surface of the sides consist of hard, solid masses loosely attached to each other, the under portion forms a network of much softer material. Turning the nest, detached at the base, over on its side, we cut away until we come to what looks like a few tablespoonfuls of fine crystalline sugar, but are really eggs in the process of hatching, carried out of the queen's chamber by the attendant workers as soon as they are laid. Taking more care, we come to a more solid mass, which is the queen's chamber, and the centre of the universe in as far as the inhabitants are concerned. The floor is flat with a regular rounded dome, about the size and shape of an inverted saucer; it is attached all round to the edge of the floor, but there are numerous openings all round, so that the attendants can run in and out. Then, in the centre of this curious cell, lies the queen, who can never move beyond the limits of her chamber; once a slender, graceful, winged insect, she now rests incapable of movement, for her head, neck, and legs have remained the same size as of old, but her body, distended with eggs, has swollen out until it is as thick as one's little finger, white in colour, and cylindrical in form. Carefully fed and tended by her little workers, her whole mission in life is to lay eggs, which are the sole means by which the life of this city of millions is perpetuated. Above the queen's

Domed Nest with Outer Wall Removed.

chamber we come to the nursery, the centre of which is a structure about the size of a man's head, formed of curled sheets of mere brittle material, and much thicker material than brown paper, in which the tiny baby white ants dwell until large enough to roam at large.

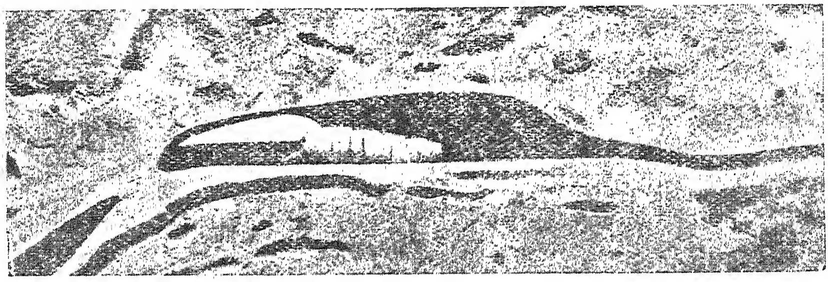
Now, the whole of this remarkable nest is composed of a kind of *papier-mache,* for, though it was once wood, it has been chewed up up as a food by the inhabitants, passed through their bodies, and deposited in the form we now see it as building material.

About the end of October this nest would have been in a regular whirl of excitement, for about that time the winged males and female white ants have undergone their final moult, cast off the pupal skin, and are ready for flight. The workers pierce the walls all over with narrow galleries, down which the winged ones crawl, but the openings first are guarded by the soldiers, until everything is ready, and then out they fly in a stream for hours. These are the flying ants which come round the lamps in such numbers on muggy evenings in the early summer, dropping their wings as they crawl over the table.

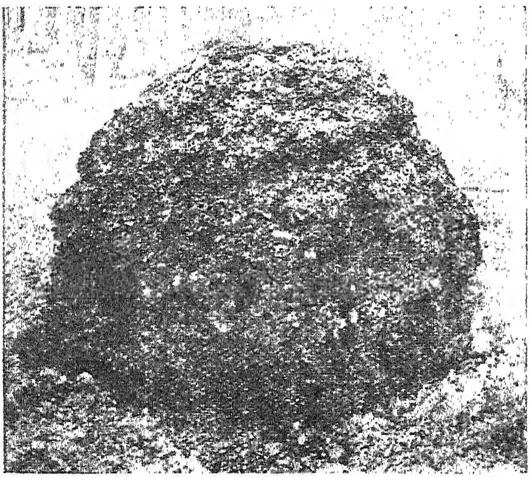


Section of Nest.

As you all know, white ants are very destructive creatures, from their habit of eating wood or anything else in their way, and are sometimes called the "carpenters' friends," because they do so much damage to woodwork which has to be repaired or renewed by the carpenter. Even in the heart of the cities they are sometimes found eating out roofs and floors of houses. A wonderful instinct seems to tell them wherever wood is to be found, and they will mine, or carry their little covered galleries many yards up a brick or stone wall to get into a roof above.

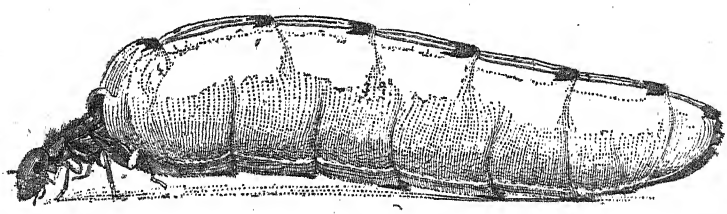


The Queen Chamber.



Nest Overturned.

White ants are looked upon as very good food by the natives of some tropical countries. It is said that once, when a great Bayere chief came to pay a state call on Dr. Livingstone in his camp, in Central Africa, the doctor, wishing to show honour to his guest, gave him some apricot jam on bread, and asked him if he had ever tasted anything as good. "Ah!" said the chief, "you should try roast white ants."



The Queen.

General Notes.

TO PRESERVE LIMES.

Many people have lime-trees growing either in gardens or orchards, but there appears to be no great demand in the Brisbane markets for the fruit, lemons being preferred. They can, however, be preserved in the following manner:—

Use small limes, not over ¾-in. in diameter. Prepare brine by dissolving salt in water till an egg will float in it. Into this place the limes and leave them there for from ten to fourteen days; then cut them in halves and scoop out the pulp; boil the skins in two or more waters until the salt and essential oil are removed; stew them in a syrup made with white granulated sugar. If crystallised limes are required, after they are stewed, dry them and dip them several times in thick syrup, drying them after each dipping.

GREEN PERSIMMONS MADE MARKETABLE.

Mr. George C. Roeding, of Fresno (says the "Fresno Republican"), has just completed a series of experiments with Japanese persimmons, which are of the utmost importance not only to the orchardists of this State but to those of the whole of the southern part of the United States, as far north as the latitude of Washington, D.C. He has succeeded in removing from the green persimmon its well-known astringent quality, so that it will be possible from now on to so prepare the fruit actually on the farm that it may be shipped, marketed, and eaten while still firm, and what is now termed green. The marketing of this fine fruit has always been very seriously affected by the fact that it is not, in its natural state, fit to be eaten until it has become so ripe as to be on the verge of decay, and so not strictly wholesome, and certainly of no use for extensive shipping. This difficulty is now removed. Mr. Roeding has been working on this idea for the past two or three years, but actually produced the fruit in marketable quantities only a few days ago, and had 1,000 lb. of it shipped east by the East Fruit Company, of this city, thus putting it into the regular channels of trade. He has also sent some of it in packages to Washington to be inspected by the authorities there. The shipping was done in 20 lb. boxes, and the boxes were sent out in refrigerator cars. The process by which the astringent quality is removed from the fruit is simple enough, and is borrowed from a widespread practice in Japan. It is simply to place the fruit in tubs, from which "saki" or Japanese "rice beer" has been lately removed. The tubs are hermetically sealed, and the fruit left in them from eight to ten days. When it is then removed, it is found to have altogether lost the unpleasant quality which draws one's mouth into a pucker with the first bite. The fruit may be eaten from the hand like an apple. It seems that the fumes of the saki coming from the wood effects the change. For this purpose saki tubs of the regular Japanese make are used. The process is widely used in Japan, where the persimmon is a very valuable product. Some interest was taken in it by the Department of Agriculture of the United States, but Mr. Roeding is conducting or has just brought to a successful close the first experiments of the kind in this country.

Mr. Roeding says that the process is thoroughly practical on the farm. He used in his last work eight large saki tubs, each of which would hold 25 gallons, and in these treated 1,000 lb. of persimmons. Thus a wide field will be opened up for this new form of industry by the possibilities now held out of getting the persimmons to the great consuming markets in good condition.—"Rural New Yorker."

Answers to Correspondents.

TO MAKE MUTTON HAMS.

"FARMER," Cooroy—

The time necessary to dry, salt, and smoke is twenty-six days. Take the leg of mutton weighing 12 or 14 lb., ½ lb. of bay salt, 10 oz. of common salt, 1½ oz. of saltpetre, ½ lb. of coarse sugar. Cut the leg of mutton into the form of a ham, and let it hang two days. Make a powder of ½ lb. of bay salt, ½ lb. of common salt, and 1½ oz. or 2 oz. of saltpetre, and ½ lb. of coarse brown sugar. Mix it well together in a stewpan to make it quite hot, then rub it thoroughly into the ham. Turn it in the pickle every morning for four days, then put in 2 oz. more of common salt to it. Turn it every day for twelve days more; then take it out, dry it, and hang it in wood smoke for a week. Or, the time to pickle would be fourteen days. Take 1 oz. of saltpetre, 1 oz. of common salt, 1 lb. of coarse sugar. Cut the hind quarter of mutton like a ham, and rub it well with 1 oz. of saltpetre, 1 lb. of coarse sugar, and the same of common salt well mixed together. Lay it in a hampan with the skin downwards, and baste it every day for a fortnight, then roll it in sawdust, and hang it in wood smoke for fourteen days. Boil it, and hang it in a dry place, cut it out in slices, and broil them as required. Or, boil the ham in cold water over a quick fire for twenty minutes. When done, let it remain in the water till quite cold.

GRASSES, TICK FEVER, SILOS, AND SILAGE.

S. F. WALKER, Coomera River—

1. *Phalaris commutata* is a native of the Southern Alps of Europe. It stands frost, makes good growth in winter, and is best adapted for cool districts. The variety known as "Toowoomba Canary Grass" has been named *Phalaris nodosa* by some botanists, and called a variety of the former.

2. Wonder Grass is a native of West or East Africa. It is a strong-growing grass affording abundance of rough feed in suitable situations. It revels in a rich soil in a tropical or subtropical climate, and makes its best growth in warm months. It is not nearly so nutritious as couch or prairie grass when at their best.

3. Nicotine is a poison, and if injected under the skin of a beast, the result would probably be disastrous.

4. No. That is, cattle will not take tick fever from one another without the aid of ticks, but a certain form of redwater is sometimes seen which is not apparently due to ticks. It is also seen in New South Wales.

5. Silage may be made in a hole or pit in the ground, or in rock, provided the situation chosen is on a ridge, or where no soakage exists, or can get in. A concrete pit silo, that is, with the bottom and sides faced with almost neat cement, makes an excellent and permanent job. No drainage is required, as no appreciable quantity of moisture can accumulate. Ordinarily, a ton of chaffed silage, when properly settled, occupies about 50 cubic ft. of space.

To feed twenty cows for three months, allowing 40 lb. per head per day, would take some 33 tons of silage.

The difference in weight of fodder between the time of putting it in and taking it out, is dependent a good deal on the quality and condition of the material, but for ordinary calculation, there is very little appreciable difference. It will always be necessary to allow for the loss of the crust of the mass, and, if your silo is not properly airtight, waste occurs where the air has access. Fodder should always be chaffed into a silo. Much waste occurs in stacks if built with coarse material, and if left any length of time, the influence of the atmosphere makes itself felt for quite 15 in. round the stack.

Your question as to the smallest size of silo it is advisable to make, refers apparently to the supply for twenty cows for three months, which has been given above as about 33 tons.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	AUGUST. Prices.
Apples (Hobart), per case	8s. to 10s.
Apples (Victorian), per case	7s. to 9s.
Apples (Local), per case	...
Apples (Cooking), per case	7s. to 9s.
Bananas (Cavendish), per dozen	2d. to 2½d.
Bananas (Sugar), per dozen	1½d. to 2d.
Cape Gooseberries, per quarter-case	7s. 6d.
Custard Apples, per quarter-case	4s. 6d.
Lemons, per case	5s. to 6s.
Lemons (Sydney), per case	5s. to 7s.
Mandarins, per case	6s. to 7s. 6d.
Oranges, per case	3s. to 4s.
Oranges (Local), per case	3s. to 4s.
Papaw Apples, per quarter-case	3s.
Passion Fruit, per quarter-case	4s.
Pears, per case	6s.
Pears (Hobart), per case	6s.
Pears (Victorian), per case	6s.
Persimmons	...
Pineapples, Ripley Queen, per dozen	4s.
Pineapples, Rough, per dozen	2s. 6d.
Pineapples, Queen, per dozen	...
Rosellas, per sugar bag	2s. 6d.
Strawberries, per tray	2s. 6d.
Tomatoes, per quarter-case	1s. 6d.

SOUTHERN FRUIT MARKET.

Apples (Hobart), per case	8s. to 10s.
Apples (Victorian), per case	7s. to 9s.
Apples (Local), per case	...
Apples (Cooking), per case	7s. to 9s.
Bananas (Cavendish), per dozen	2d. to 2½d.
Bananas (Sugar), per dozen	1½d. to 2d.
Cocoanuts, per dozen	2s.
Lemons (Local), per gin case	5s. to 6s.
Lemons (Italian), per half-case	5s. to 7s.
Mandarins (Local), Emperors, per gin case	...
Mandarins (Medium), per half-case	6s. to 7s. 6d.
Oranges (Choice), per case	3s to 4s.
Oranges (Navel), per case	3s. to 4s.
Passion Fruit (Choice), per half-case	4s.
Peanuts, per lb.	3d.
Pears (Choice), per bushel	6s.
Pears (Medium), per bushel	6s.
Persimmons, per box	...
Pineapples (Queensland), Ripley Queen, per case	4s.
Pineapples (Queensland), Choice, Queens, per case	2s. 6d.
Pineapples (Queensland), Choice Common, per case	...
Quinces, per gin case	...
Rock Melons, per dozen	...
Strawberries (Queensland), per 3-quart tray	2s. 6d.
Tomatoes (Queensland), per quarter-case	1s. 6d.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR AUGUST.

Article.		AUGUST. Prices.
Bacon, Pineapple	lb.	$7\frac{1}{2}$d. to 9d.
Barley, Malting	"	3s. 6d. to 3s. 9d.
Bran	ton	£5 7s 6d
Butter, Factory	cwt.	124s. to 128s.
Chaff, Mixed	ton	£5 5s.
Chaff, Oaten	"	£4 15s.
Chaff, Lucerne	"	£3 to £7 10s.
Chaff, Wheaten (Straw)	"	£2 15s.
Cheese	lb.	7d. to 1s.
Flour	ton	£12 10s.
Hay, Oaten	"	£5 10s. to £6.
Hay, Lucerne	"	£6
Honey	lb.	$2\frac{1}{2}$d. to $2\frac{3}{4}$d.
Maize	bush.	4s. 1d.
Oats	"	3s. 4d. to 3s. 3d.
Pollard	ton	£5 15s.
Potatoes	"	£4 10s. to £8, £7 to £7 15s.
Potatoes, Sweet	"	£3 to £3 10s.
Pumpkins	"	£3 to £3 5s.
Wheat, Milling	bush.	5s. 9d.
Wheat, Chick	"	...
Onions	ton	£9 to £10
Hams	lb.	11d. to 1s. 1d.
Eggs	doz.	10d. to 1s.
Fowls	pair	2s. 2d. to 3s. 6d.
Geese	"	5s. 6d. to 6s.
Ducks, English	"	3s. 6d. to 4s.
Ducks, Muscovy	"	4s. to 4s. 6d.
Turkeys (Hens)	"	5s. 3d. to 6s.
Turkeys (Gobblers)	"	9s. to 12s. 6d.

ENOGGERA SALEYARDS.

Animal.	JULY. Prices.
Bullocks	£8 10s. to £9 12s. 6d.
" (single)	£11 12s. 6d.
Cows	£6 5s. to £7 15s.
Merino Wethers	18s. 6d.
Crossbred Wethers	16s. 9d.
Merino Ewes	15s.
Crossbred Ewes	16s. 3d.
Lambs	12s. 3d.
" (Prime)	15s. 9d.

Farm and Garden Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, sorghum, setaria, imphee, prairie grass, panicum, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred. The planting of the sisal agave and the fourcroya may be proceeded with at any time of the year, but the best time is in spring and beginning of summer, when warm weather and good showers will enable the young plants to root quickly and become firmly established before the winter. The demand for the fibre is constantly increasing, and the supply does not nearly overtake the demand; hence prices keep high, and the outlook for the future is very promising. See our instructions in "The Sisal Industry in Queensland," obtainable free by intending planters on application to the Under Secretary, Department of Agriculture and Stock. Plant only on dry or well-drained soil. Cotton may still be sown.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of all kinds of vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the crops will be drawn and worthless. Thin out melon and cucumber plants. Give plenty of water and mulch tomato plants planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant chrysanthemums, gladiolus and other bulbs,such as tuberose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

Orchard Notes for October.

By ALBERT H. BENSON, M.R.A.C.

THE SOUTHERN COAST DISTRICTS.

As October is often a dry month throughout the greater part of the State, one of the most important duties of the fruit-grower is to keep his orchard or vineyard in a thorough state of cultivation, thus retaining the moisture in the soil that is essential to the setting and development of the fruit crop. As long as the land is level one cannot over-cultivate, as there is no danger of the soil washing, but when the orchard is on a hillside heavy thunderstorms, which may occur during the month, are very apt to cause heavy washaways of soil if the land is kept in the high state of tilth necessary to retain moisture. In this case the cultivation should always be across and not up and down the face of the hill, and where the soil is of such a nature that it will wash badly thin blocks, consisting of a row or two of a growing crop or of light timber, brushwood, or even a body of weeds or heavy mulching, should be provided, such blocks to follow the contour of the orchard. If dry, and water for irrigation is available, citrus trees will be the better for a thorough watering during the month. Give the trees a good soaking, and follow the irrigation by systematic cultivation, as this is much better than constant surface watering, as practised by the Chinese. Examine the orchard and vineyard carefully for pests of all kinds. When young trees are showing signs of scale insects, cyanide same; when leaf-eating insects of any kind are present, spray the plants that are being attacked with arsenate of lead. Look out carefully for black spot and oidium in grape vines, using Bordeaux mixture for the former and sulphur for the latter. When using sulphur, see that you get a fine sample —viz., one in which the particles of sulphur are in a very fine state, as the finer the sulphur the better the results. Do not apply the sulphur in the early morning, but during the heat of the day, as it is the sulphur fumes, not the sulphur, which do the good. A knapsack sulphurer is the best machine for applying sulphur to grape vines, trees, or plants.

Examine any late citrus fruits or early summer fruits for fruit fly, and take every precaution to keep this great pest in check now, as, if fought systematically now, it will not do anything like the same amount of damage later on as if neglected and allowed to increase unchecked. October is a good month for planting pineapples and bananas. Be sure and have the land properly prepared prior to planting, especially in the case of pineapples, as the deeper the land is worked and the better the state of tilth to which the surface soil is reduced the better the results, as I am satisfied that few crops will pay better for the extra work involved than pines.

TROPICAL COAST DISTRICTS.

As the fruit fly usually becomes more numerous at this time of year, especial care must be taken to examine the fruit thoroughly prior to shipment, and to cull out all fruit that has been attacked by the fly. Banana and pineapple plants may be set out, and the orchards should be kept well tilled, so as to have the land clean and in good order before the heavy summer growth takes place.

All the spring crop of citrus fruits should be now marketed, and the trees, where necessary, should be pruned and sprayed, and the land be well ploughed. The ploughing should be followed by harrowing and cultivating, so as to get the surface of the land into good order. Granadillas and papaws should be shipped to the Southern markets, as, if care is taken in packing and they are sent in the cool chamber, they will carry in good order. These fruits should not be gathered in an immature condition, as, if so, they will never ripen up properly. They should be fully developed but not soft, and if gathered in this condition, carefully handled, and packed and shipped in cool storage, they will reach the Southern markets in good condition, and, once they become more commonly known, will meet with a ready sale.

Southern and Central Tablelands.

In the Stanthorpe district the spraying of apple, pear, and quince trees for codling moth will have to be carefully carried out, the best spray being arsenate of lead, of which there are several reliable brands on the market.

When fungus diseases, such as powdery mildew, &c., are also present, Bordeaux mixture should be combined with the arsenical spray.

The vineyard will require considerable attention, as the vines must be carefully disbudded, and any signs of oidium or black spot should be checked at once. Look out for late spring frosts, and, if possible, try the effect of smudge fires producing dense smoke for preventing any damage.

Keep the orchards and vineyards well cultivated, as it is of the utmost importance to keep the moisture in the soil at this time of the year if a good fruit crop is to be secured.

In the warmer districts cultivation is all-important, and when irrigation is available it should be used for both fruit trees and vines, a thorough soaking followed by systematic cultivation being given.

Agriculture.

WHEAT-GROWING.

Most of the forms of wheat in cultivation are varieties of *Triticum sativum*. The greater number of these are beardless, the remainder are bearded or awned. The soft, beardless wheats are divisible into groups, according as the ears are white, reddish, or red; and the white and red varieties are again classed in accordance with either the smooth or downy character of the chaff. Of the smooth-eared wheats, whether white or red, the final division is determined by the colour of the *grain*—white on the one hand, red or yellow on the other. The best wheats are found in three groups —(1) *Triticum sativum*, the common wheat of Europe, America, Australia, and India; (2) *Triticum turgidum*, cone wheats, grown for quantity, not quality; (3) *Triticum durum*, hard wheat. Wheat is also divided into "hard" and "soft" classes, the "hard" being generally grain produced in climates with little moisture, and contains a large percentage of gluten.

The origin of the wheat plant is shrouded in mystery, but in 1906 a remarkable discovery was made by a young German scientist named Aarensohn, in Upper Galilee on the mountains of Naphtali, where he found wheat growing in a wild state, and pursuing his researches he found, at the foot of Mount Hermon, true fields of this wild wheat. In 1907 he was in a position to confirm the existence of numerous uncultivated fields of this primeval wheat in ancient Moab. Of this discovery, he said: "The varieties of wheat which we cultivate at the present day do not thrive without culture and care. Without man's care they would only survive for one or, at the most, two years, when they would be destroyed by the wild vegetation. The wild varieties which I have brought with me from Upper Galilee thrive there on very stony ground, on the slopes of perfectly arid ranges of hills, parched by the glowing rays of the Eastern sun, where the soil lies only thinly on the rocks, and where no other vegetation occurs. Yet, in spite of these unfavourable conditions, the wild wheat ripens, producing splendid ears, the grain measuring over $\frac{2}{5}$ in. long. It withstands all vicissitudes of climate, growing in deep valleys below sea-level, and also at a height of 3,000 ft. above it, reaching, on Mount Hermon, almost to the snow line. In this lies the economic significance of the discovery. By scientific selection and careful treatment it will without doubt be possible to make the experiment of growing this wheat, and to extend its cultivation to those unfruitful regions in which, at present, wheat culture is impossible." Experiments with this wheat are being made by the United States Department of Agriculture, and in Germany by the Agronomic Institute of Bonn-Poppelsdorf. If this wheat were introduced into Queensland and "domiciled" by experiments at the State Farms, it is possible that a variety might be evolved which would be able to stand continuous dry weather in our arid but fertile Western lands.

Whatever country may claim to be the primeval home of the wheat plant, it is sufficient to know that wheat culture is one of the most important industries in the world, and I will now present the essential facts of experience concerning the wheat soils of the State and their preparation, and the subsequent treatment of the crop, to which will be added some account of the fungus diseases of wheat and the means to be adopted to overcome them.

The almost unlimited field for expansion of the wheat industry in Queensland, and the many factors essential for its development, afford an all-absorbing subject surrounded with many undetermined problems.

Our present exploited wheat-growing belt offers such a diversity of situation, soil, and climate that the production of perfect wheats for local conditions is not yet completely solved. Much has already been accomplished by the intelligent observation of farmers in selecting and propagating some

"sport" or variety of wheat which has made its appearance in their crops, and has developed probably an innate characteristic causing it to differ in some respects from the original.

On the other hand, the improvement by cross-fertilisation, followed by a system of selection and the fixing of types, commends itself as a means whereby the strength of flours may be readily increased, and by which any well-known defect of some largely-grown wheats may be remedied. Wheat is a crop which, all over the world, gives the best results on strong soils—*i.e.*, those having a considerable admixture of clay. On this account, deep, argillaceous soils, having a large proportion of humus, combined more or less with sand or gravel, are known commonly as "wheat lands." Nevertheless, wheat is often grown successfully upon sandy and alluvial soils, and in Queensland upon the red volcanic soils common in nearly every part of the State. This, however, is always true: Wheat can only be grown systematically—that is, as a branch of general farming—upon land that is either naturally or artificially in high condition. Wheat makes heavy demands upon the soil, and takes from it its best and most precious constituents. The red volcanic soils owe their great value as farming lands not so much to their intrinsic fertility as to physical qualities. They are nearly always very deep, well-drained, and their ultimate particles exist in the form of an almost impalpable powder. They are as excellent for wheat-growing as they are for lucerne and sugar-cane.

It is probable that the area of land suited to wheat-culture in Queensland is greater than the aggregate of all the present wheat areas of the continent of Europe.

The preparation of the ground for a wheat crop is very simple, but there are farmers who do not take any trouble to prepare the ground in such a manner as to ensure a fair crop. In some cases they merely scratch the soil with the plough, or do not even go beyond harrowing the seed into unploughed land. Wheat land should have two ploughings to a depth of at least 6 in. Then a first harrowing should follow, and the ground be got into the best possible condition before sowing. To prevent the attacks of fungoid diseases, such as rust, smut, bunt, &c., the seed wheat must be treated in a certain manner. Smut is a fungoid disease. It attacks wheat, oats, barley, rye, and many grasses. Bunt is another of the fungoid diseases. It is often mistaken for smut, but it differs considerably from the latter, and its effects are not seen until harvest time, when, if an apparently healthy ear of wheat is opened up, it is found to contain nothing but a greasy, evil-smelling mass of black spores. The spores, whether of bunt or smut, remain on the wheat after it is threshed, and, unless precautions be taken, these will be sown with the seed, and the crop will certainly be smutted or bunted.

There are several methods adopted whereby the smut spore may be killed. One way is, to pickle the seed it is intended to sow in a solution of sulphate of copper. Mix a solution at the rate of 1 lb. of sulphate of copper in 1 gallon of water. This will suffice to steep 4 bushels of wheat. The seed may be either put in a gunny bag and then dipped in the solution, and, after removal, allowed to drain, or it may be spread out on the barn floor and the solution poured over it, but this is a wasteful process. The seed may be pickled a month or six weeks before sowing, so as to let the sulphate (bluestone) become thoroughly dry, when the spores will be effectually killed, as the copper forms a film on the seed, destroying the spores without injuring the germ of the wheat.

Another method is by hot water treatment. If this method is adopted, take two washtubs and a basket or gunny bag. Fill the latter three-parts full of seed. Then half-fill one of the tubs with cold water, and boil an equal quantity, which is then to be added to the cold water. This will bring the temperature of the water to about from 130 to 132½ degrees Fahr., which latter is the proper temperature. Into this plunge the basket or bag of seed,

and keep it there for a quarter of an hour, lifting and lowering it several times meanwhile. In this process a thermometer must be used, as the temperature must not be allowed to go below 130 degrees nor higher than 135 degrees Fahr. At the end of fifteen minutes remove the basket or bag, let it drain, spread the seed out on the barn flour, and either sow it at once or allow it to thoroughly dry if not ready to sow. Wheat may be sown either broadcast or, as is now usually done, by a seed-drill. In sowing broadcast, 1 bushel per acre is more than sufficient. With a seed-drill, 20 lb. of seed is ample. Many farmers sow too much seed. Take the instance of 1 bushel to the acre. Fair average seed will run 800 grains and good plump seed 700 grains to the ounce, so that a bushel of 60 lb. contains 750,000 grains. In a square acre there are 4,840 square yards or 43,560 square feet. Thus a bushel to the acre means from 15 to 18 seeds per square foot. Say that one-quarter of this fails to germinate, being partly eaten by birds, partly insufficiently covered, yet we have still from 12 to 14 plants per square foot—that is, just twice as many as there should be. A seed-drill is generally constructed to sow from 35 to 40 lb. per acre, and, since the seed is all properly covered, there will be nearly as many plants per acre as with a bushel sown broadcast.

What is the consequence of this crowding of the plants? They have to fight each other for moisture and plant food, and thus become stunted and do not stool out properly. Far better, then, to drill in only 20 lb. of seed per acre.

Now, about harrowing after sowing. The harrowing should be done crosswise to the direction in which the land was ploughed. The work will be more effective, and it will be better for the crop.

Rolling the wheat, even when it is a foot high, is also productive of good. The rolling prevents "lodging" by consolidating the soil, and thus, by decreasing its power to supply overmuch nitrogen to the plants, results in the production of a less luxuriant plant, with roots which have a firm hold of the consolidated soil. In this way the danger of lodging is avoided.

Should the great enemy of wheat—rust—make its appearance, it is well not to be in too great a hurry to cut the crop for hay, as it is quite possible that a really good grain crop may be sacrificed. Should the rust, however, go too far, then by all means cut it, for it will pay as hay, whereas it will be worth nothing for grain.

The best time to sow wheat in the Southern part of the State is from April to June. March is considered the best time in the North.

If early sowing is necessary, sow thin; if late, sow thicker.

PEANUT MACHINERY.

The usual method of taking up peanuts on a small area is to fork them out after cutting away the haulms or vines. But where they are grown on an extensive scale, this method is too slow, laborious, and expensive. Consequently machinery of some kind must take the place of hand labour, and several peanut diggers have been invented. From the "Natal Agricultural Journal," of April, 1909, we take the following short description and illustration of a digger which has been placed on the market by an American (?) firm, and which is said to do the work satisfactorily. It is a small plough specially designed for peanut harvesting. The manufacturers state: "For harvesting peanuts, they use a peanut point or share as shown in the illustration. The regular point and mouldboard used in the cultivation of peanuts is removed and the peanut point put on. This is long and narrow. The idea is to run the long point under the nuts and cut what is known as the tap-root, and then the vine is easily lifted from the ground with the nuts hanging on. You give them a shake and the dirt falls off.

A more elaborate digger (the O.K. Champion Peanut Digger), is even more a labour-saving device. At the front of the digger is a shovel which is run in beneath the row, and raises the ground and nuts, which are then deposited on specially-constructed carriers. These break up the ground, loosening the nuts so that they are easily extracted. The carriers convey the nuts and vines up over the machine, whilst the dirt loosens itself through the links of the carriers, and leave the ground in level condition for the vines and nuts to be deposited by a shaking fork rower. The latter contrivance not only deposits the vines and nuts, but, by its vigorous vibration it cleans any remaining dirt from the nuts, and leaves them clean in a row behind the machine in good shape for gathering and stacking.

A vine-cutter is also manufactured which is bolted to the front truck wheels. It consists of a specially stamped crucible coulter steel disc with keen edge, with a protecting guard covering the upper and front side of the blade. This is an essential feature when digging the running vine variety of nuts. The whole machine is light of draft, being easy work for two horses. It has but two gear wheels to drive the entire working parts. The price of this machine is 50 dollars (£10) at the factory, to which, of course, the importing charges, such as freight, duty, commission, &c., would have to be added.

Another machine of interest to which we may draw attention whilst we are discussing peanut implements is the O.K. Champion Peanut Planter. This machine will plant shelled and unshelled nuts by interchanging feed cups. It has a wide shoe that levels the ground 12 in. wide to the row; under, and to the rear of this shoe is a keel which opens the trench for the reception of the seed. The seed is dropped into this trench by the cups through the spout; two scrapers follow immediately after the feed spout, covering the seed with loose ground. Then comes the concave pressure wheel which presses the ground firmly on the nuts, and leaves a well-rounded ridge over the row of seed. The dropping device is an endless chain of cups, just large enough for one nut to drop into. The factory price of this machine is 16 dollars (about £3 6s.).

All information concerning these machines can be obtained from Messrs. Malcomess and Co., Limited, Durban, Natal, South Africa.

BREAKING UP OF SUBSOIL BY GUNPOWDER.

Kansas farmers show a good deal of ingenuity in pursuing their calling Nothing comes amiss to them. The question of expense in improving the quality of their ground will not stand in their way if they see a chance of profit in the outlay. Of late they have been operating on the compact subsoil or hardpan which is found in some places. Such stratum checks the growth of cereals, grasses, lucerne, fruit trees, &c., and also affords a poor host for moisture. An ex-Governor of the State, M. S. J. Crawford, tried an experiment with gunpowder. He desired to plant lucerne, a deep-rooter, and the hard subsoil rendered it unlikely that the crop would give good results. An ordinary 2-in. auger was used to bore holes in the ground, from 2 to 6 ft. deep and from 20 to 30 ft. apart, according to the nature of the subsoil. One stick of ordinary blasting powder was placed in each hole, and exploded. The ground was broken up to a radius of from 10 ft. to 15 ft. from each charge, and the total wholesale cost of powder, caps, and fuse per acre was 6s. 3d. The holes made were filled with sand or gravel so as to keep them open permanently as a passage way for surplus rainfall. Mr. Crawford contends that the expenditure is repaid by one year's added yield of wheat, maize, lucerne, or whatever crop is cultivated.—"Farmer and Grazier."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF JULY, 1909.

Number.	Cow's Name.	Breed.	Date of Calving.	Total Milk.	Average Test, Per cent.	Commercial Butter.	Remarks.
				Lb.		Lb.	
1	Lass ...	Ayrshire ...	15 June, 1909	974	4·3	46·97	
2	Honeycombe	Shorthorn ...	11 April ,,	967	4·2	45·99	
3	Linda ...	Ayrshire... ...	11 April ,,	1,026	3·9	44·65	
4	College Lass	,, ...	31 Jan. ,,	785	4·2	36·93	
5	Nellie II. ...	Shorthorn ...	1 Mar. ,,	702	4·0	31·37	
6	Winnie ...	,, ...	2 June ,,	665	3·7	27·37	
7	Lubra ...	Jersey-Ayrshire	5 April ,,	513	4·7	27·14	
8	Lady Vixen	Shorthorn ...	25 June ,,	653	3·7	26·87	
9	Ivy	Jersey	16 June ,,	553	4·3	26·66	
10	Rosalie ...	Ayrshire ...	10 Feb. ,,	626	3·8	26·50	
11	Rosepetal ...	Shorthorn ...	7 May ,,	580	3·8	24·55	
12	Butter ...	,, ...	20 Feb. ,,	576	3·7	23·60	
13	Lady Ring	Guernsey ...	26 Jan. ,,	412	4·9	22·77	
14	Reamie ...	Ayrshire... ...	7 July ,,	560	3·6	22·40	
15	Cheerful ...	Shorthorn ...	4 July ,,	514	3·9	22·36	
16	Chocolate ...	,, ...	3 June ,,	511	3·8	21·63	
17	Beauty ...	Ayrshire ...	11 April ,,	476	3·7	19·59	
18	Dewdrop ...	Holstein... ...	11 Nov., 1908	461	3·5	17·87	
19	Glen ...	Shorthorn ...	29 Jan., 1909	378	4·0	16·88	
20	Mona ...	Holstein Shorth'n	13 July, 1907	385	3·9	16·74	
21	Conceit ...	Ayrshire ...	22 Nov., 1908	406	3·7	16·71	
22	Blackbird ...	Grade Holstein	4 Feb., 1909	371	4·0	16·57	
23	Bangle ...	Shorthorn ..	23 Feb. ,,	369	4·0	16·49	
24	Daisy ...	Holstein... ...	24 Oct., 1908	406	3·8	16·24	

From 1st to 20th July, cows received 35 lb. chaffed sorghum daily.
From 21st to 31st July, cows received 40 lb. maize ensilage daily.

RECORD OF COWS FOR MONTH OF AUGUST, 1909.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Linda ...	Ayrshire... ...	11 April, 1909	909	4·0	40·60	
Lass... ...	,, ...	15 June ,,	861	4·2	40·50	
College Lass	,, ...	31 Jan. ,,	798	4·1	36·59	
Rhoda ...	Ayrshire Shorth'n	4 Aug. ,,	833	3·7	34·29	
Lubra ..	Grade Jersey ...	5 April ,,	582	4·7	30·80	
Remit ...	Holstein... ..	4 Aug. ,,	740	3·5	28·72	
Winnie ...	Shorthorn ..	2 June ,,	634	4·0	28·33	
Reamie ...	Ayrshire... ...	7 July ,,	705	3·6	28·20	
Nellie II. ...	Shorthorn ...	1 Mar. ,,	618	4·1	27·93	
Butter ...	,, ...	20 Feb. ,,	624	3·9	27·15	
Chocolate ...	,, ...	15 June ,,	547	4·4	27·01	
Lady Vixen	,, ...	25 June ,,	628	3·8	26·58	
Rosepetal ...	,, ...	7 May ,,	605	3·8	25·62	
Rosalie ...	Ayrshire... ...	10 Feb. ,,	618	3·7	25·43	
Glen ...	Shorthorn ...	29 Jan. ,,	528	4·0	23·59	
Ivy	Jersey	16 June ,,	592	3·7	23·36	
Cheerful ...	Shorthorn ...	4 July ,,	513	4·0	22·92	
Lady Ring	Guernsey ...	26 Jan. ,,	395	5·0	22·30	
Beauty ...	Ayrshire... ...	11 April ,,	496	3·6	19·84	
Cuckoo ...	Jersey	24 July ,,	490	3·6	19·60	
Mona ..	Grade Holstein	13 July, 1907	482	3·6	19·28	
Helen ...	Grade Guernsey	8 Aug., 1909	467	3·7	19·22	First calf.
Daisy ...	Holstein... ...	24 Oct., 1908	444	3·8	18·79	
Honeycombe	Shorthorn ...	11 April, 1909	819	4·1	37·56	
Dewdrop ...	Holstein ...	11 Nov., 1908	455	3·5	17·65	
Poppy ...	Grade Guernsey	6 Jan., 1909	390	4·0	17·32	
Conceit ...	Ayrshire	22 Nov., 1908	406	3·8	17·19	
Bangle ...	Shorthorn ...	23 Feb., 1909	382	4·0	17·06	
Gem ...	,, ...	15 Dec., 1908	376	4·0	16·35	

Fed on 50 lb. maize ensilage daily, and grazed on natural pasture.

CHEESE-MAKING.

Paper read by Mr. E. Graham, Dairy Expert, before the Members of the Conference of Cheese Manufacturers on 9th September, 1909.

The anticipated general exportation of cheese presents a new feature in the dairying history of Queensland. Parcels of varying magnitude have been consigned in the past, but the future prospects are that exportation will need to be resorted to for at least portion of any season showing a normal production.

The success or otherwise of the cheese trade will undoubtedly depend upon the quality of the article we can supply, together with our willingness to suit the oversea purchasers' demands as regards detail in manufacture, &c., it being well to keep in mind that the London buyer is most conservative in his trade customs.

That a first-class cheese can be produced in Queensland is a point upon which all are agreed, but the makes from day to day have not that uniformity so essential to establish and maintain a prominent position on an oversea market.

In our attempt to make a cheese up to the export standard of quality, we are confronted with several difficulties, all of which I hope will be successfully overcome.

Probably the greatest existing evil is the carrying of whey from the factory in the milk cans. This is a practice so serious that it cannot be treated half-heartedly. Either Regulation No. 44 will need to be reverted to, or the requirements of Regulation 48 rigidly enforced. Another alternative, and one with a good deal to commend it, is the retaining of the whey at the factory and selling it outright, similarly as most of the butter is now disposed of. Personally I am decidedly adverse to the milk cans being used for holding whey under even the most favourable conditions, and, if it is considered essential to cart it home, would support the method of carting it in a separate vessel. Provision could, perhaps, be made to do this by having specially made axles on the conveyance used in milk cartage so as to retain the whey in the bottom of the milk cart. This method was some years ago advocated by the New Zealand authorities as a means of removing the evil influences of whey upon the quality of that country's cheese output.

It is hoped before the Conference disperses that this matter will be fully discussed, and an effective remedy decided upon.

It is generally set up that the whey is not of any great value, and, if an estimate of the loss in quality of the cheese accruing from its presence could be made, I feel sure the amount would greatly exceed the total value of the whey.

The factory manager alone cannot do all that is necessary to place on the oversea markets a cheese of sufficiently high grade to compare favourably in price with the supplies coming forward from the foremost cheese countries of the world. The full assistance of the milk producer, working in harmony with him, is necessary.

Given a factory with all modern conveniences, he should make from first-class milk a high-grade cheese. No more can be legitimately expected of him. The whole matter resolves itself into the production of a good, clean, sound milk, it being an established rule that the quality of the cheese made will agree in almost the minutest detail with the quality of the milk utilised in its production. The production and caring of the milk up to the time it is delivered at the factory are essentially the farmer's business, and the farmer must observe, in the fullest detail, all matters relative to the production of a clean, sound milk, not forgetting that the milk is in his care

at the time when it is most subject to contagion, for the temperature is at its highest point as the milk comes from the cow, and bacterial development will also be greatest at such a period.

Immediately after milking is the most opportune time for the removal from the milk of gases, food flavours, animal heat, &c. This can be done by aeration and cooling. If the milk is not treated at this stage, it is found that the above flavours become absorbed by the milk, and cannot afterwards be successfully eradicated.

Every milk supplier to a cheese factory should use the aerator and cooler for treating his milk supply before he despatches it to the factory.

The mixing of warm and cold milk is not advisable, and a second aeration of the milk at the factory would be beneficial.

During wet weather the experience of cheese-makers is, that the quality of the cheese then made is below standard. The curd is of a spongy nature and carries a foreign taint. Close investigation has shown the cause to be due to irregularities in the conditions under which the milk is extracted from the cow. It may be that particles of slush are deposited in the milk pail, as can easily happen by a cow kicking or slipping in the bail, or that germ-laden moisture has dripped from the cow's body into the milk bucket. Such milk certainly would be unfit for cheese purposes. Another general source of contamination in wet weather is the handling of the leg-rope by the milker. The leg-rope becomes so dirty that even the washing of the milker's hands in cold water is insufficient to cleanse them, and there are doubts as to this precaution being always taken. Perhaps the simplest method of overcoming the latter trouble is to allot the leg-roping to one person.

Cheese factory managers will need to exercise extreme care in protecting themselves from the continued use of inferior milk, and take steps to trace any irregularities to the source responsible.

This can be done by the factory managers adopting the following test, which you will see is comparatively simple:—

> For the purpose of the test, a numbered and sterilised pint-glass jar is allotted to each supplier, and the jar three parts filled with an average sample of the milk delivered by each dairyman. The jars are then placed in a water bath and the temperature of the milk brought up to 98 degrees Fahr. To each jar is then added 10 drops of rennet extract, and mixed with the milk. The milk is thus curdled. Twenty minutes after coagulation, the curd is cut into fine pieces with a small knife, and, after settling, the whey drawn off. The best tests are made when the separation of the whey is most complete. By allowing the samples to stand for a short time, more whey can be drawn off, and the curd thereby rendered firmer. The water around the jars is kept at 98 degrees, and the curds allowed to ferment for some hours. During this time the impurities in any particular sample will cause gases to develop, so that, by smelling and cutting the curd with a sharp knife, those having a bad flavour, or a spongy or in any way abnormal texture, may be easily detected, and the samples containing the defects traced to the dairy farmer responsible.

The results from this test are reliable if intelligently carried out, and remove the erroneous impression held by some dairymen that faults in the individual supply of milk cannot be detected.

Amongst other things, London will require a clean, flavoured cheese, or, in other words, a cheese made from clean milk. The texture should be close and silky. Open and loose-bodied cheese is looked upon as having

most serious defects. Such a cheese has a bad appearance when cut and re-exposed for sale: it dries up more quickly, and there is undue waste in retailing a crumbly-textured cheese. Even in cases where the flavour is fairly good, buyers will not give the same price where there are existing faults of this kind in the manufacture.

The cheese should weigh from 60 lb. to 80 lb., a recognised suitable size being the "Double Gloucester." Two such cheeses would comprise a crate. Perhaps it may be found later that a cheese of the same weight, and having a larger diameter, would have its advantages.

The light straw-coloured cheese which we are accustomed to make for local requirements is, I understand, unsuitable for London. For that market, the cheese must be either without added colouring matter or a fairly high-coloured article. New Zealand finds 1¼ oz. of colour to 100 gallons of milk gives the desired tint.

To avoid the cost of reclassing the cheese on landing, it is advisable to mark the crates containing the cheese with a distinguishing letter "C," representing cheese with colouring, and "W" representing those makes devoid of added colouring matter. Of course, it is taken for granted that cheese of mixed colours will never be packed together.

To ensure the quantity of each crate being uniform, care should be taken to place a distinguishing mark on the cheese made each day. The necessary particulars, which should be stencilled on the cheese, are, the number or letter denoting the vat and the date and month; thus, for the 9th of September, the first vat could be called A and the figures would be 9-9, and in packing each crate should contain cheese of similar brandings. This will mean probably that only one cheese in each vat will need examination and probing with the grading inspector's trier, and will also provide a uniformity in the quality of the contents of each crate.

The letters used in marking should be 1½ in. high. Queensland shipments should reach their destination at a favourable time, New Zealand probably being our strongest competitor.

In fixing the temperature at which the cheese should be carried, consideration of the condition of the consignment in question is necessary. If a matured parcel is tendered for export, the temperature in transit will need to be lower than if the cheese were green and curdy. Cheese should never be frozen hard like butter; the best results will be derived from holding them at from 55 to 60 degrees Fahr. The percentage of shrinkage in the weight of the cheese shipped will be influenced by—

1. The age of the cheese.
2. The amount of moisture retained in manufacture.
3. Temperature at which the consignment is carried.

In well-made mature cheese, the shrinkage should not exceed 3 per cent., but in newer makes it will fluctuate from 5 to 7 per cent.

The paraffining of cheese reduces the shrinkage considerably, but cheese under three weeks old should not be paraffined.

The cost of paraffining would be about 1½d. per cheese, a large cheese taking about 4 oz. of paraffine. If paraffine is used, it is advisable to colour it, as paraffine, without colouring, gives the cheese an unsightly chalky outside appearance. The prejudice against paraffining seems to be diminishing.

The trade description required on export cheese under the Commerce Act Regulations is very similar to the particulars now in vogue on the butter boxes.

Where no cream is extracted from the milk, the cheese should be described as "Full Cream Cheese," the complete registered trading name of the manufacturer or his registered brand, name of the State, and the word "Australia," together with the net weight, being given. The particulars to be indelibly impressed. These markings should appear on each end of the crate.

The cheese for examination should be sent to an "appointed place" for inspection by the grading officers. In the past the officers have graded cheese at places to suit the exporters' convenience, but, formerly, the quantities examined were small.

The prospects of expansion in this branch of the export trade are such as to make this change necessary.

A matter that may be thought worthy of consideration by this Conference is the temperature at which the cheese is carried from the factory to the port. The quality, appearance, and weight of the cheese are prejudicially influenced by any high temperature the cheese may be subjected to. The temperature of the cars conveying the cheese could probably be controlled as in the case of butter consignments.

SPRAYING DAIRY CATTLE.

Mr. S. F. Walker, of Hazelwood, Upper Coomera, forwards us the following note on his method of spraying his dairy stock:—

In the past, I have had a great deal of trouble in keeping my cattle free from ticks, as my dairy was situated about six miles from a cattle dip, and, owing to driving them twelve miles to it, they went off their milk for a few days after each dipping. Considering the many obstacles I had to encounter, I concluded it would be cheaper to build a suitable yard and spray my herd, numbering sixty head, and my experience leads me to the opinion that the average small dairyman would find that spraying would be saving of time, money, and danger—of time in driving, of money in cost of dipping, of danger of poisoning, for I am of opinion that a fair number of stock that we see every day losing condition for no outward visible reason but pure cussedness after a long drive, and which eventually die, are in truth poisoned by the dip fluid which they have every chance of swallowing in any dip, but more especially in a plunge dip, or in one of those cage dips where they are kept down too long. Now, in reference to the spraying. I built a small crush in a corner of my milking yard, with a small draining yard at the back of it, 8 ft. square, just big enough for one cow. The crush I made 8 ft. long by 2 ft. 6 in. wide, by putting four round posts in the ground 2 ft. deep and 5 ft. 6 in. high, with four round rails checked from the inside, the first rail 15 in. from the ground, the second and third 12 in. apart, and the fourth (the top rail) 15 in. above the third. On each side of the crush I put a fence 3 ft. away from the rails of the crush, covering this fence on both sides of the crush with 6-ft. sheets of galvanised iron—four sheets of iron on the sides, to keep away loose spray. The concrete floor has a fall from the draining pen to the rear of the cow, where there is a concrete tank sunk to catch all the dipping fluid.

The next thing is to fix a spray pump with about 20 ft. of armoured hose. With these, a cow may be sprayed in two minutes after she is in the crush.

The cost of this installation is small; 5 bags of cement at 5s. per bag, 25s.; 8 sheets of second-hand 6-ft. iron at 1s. 6d. per sheet, 12s.; and a spray pump, such as is used by orchardists, £4 10s. Four pair of hinges for small gates, 4s. Cost of material for tank, £6 11s.

The accompanying Plate shows the ground plan of the spray pen.

The wall at the well must be higher than the surrounding ground, to keep out rain water, and is covered with a sheet of iron.

By having the double gates in front, as on the level crossing of a railway line, the operator can get all round the beast without going into the draining pen. The whole area of the concrete floor is 8 ft. 4 in. by 18 ft. 4 in. The gate at the rear of the crush, when open, forms part of the wing. An overflow for rain water must be arranged by putting a plug in the sink-hole of the well.

A POPULAR ERROR.

A writer in the "Farmer and Stockbreeder" says that white round the eye of a hack has been erroneously taken as a sign of vice, and he explains how the error arose thus:—

Suppose, in consequence of movements behind a horse, be becomes nervous and threatens to defend himself by kicking or pushing, he widely opens the eye for information, and possibly for direction of the defensive kick, thereby showing the white. Hence a blood horse harmlessly flinging one hind leg, as is the habit of so many good ones, is erroneously suspected of evil designs when he shows the white of his lovely eyes in fear, and not with vicious intent, the bad handling and management being alone responsible.

In the show ring the hack must carry his tail in perfect form, and he must walk, trot, and canter with musical precision and balance, all movements being particularly smooth and graceful, or he will secure no rosette.

LAMB'S FUR.

Writing rather more than a century ago, Dr. Pallas, the celebrated naturalist, describes the curious treatment to which lambs were subjected in certain parts of Russia in order to obtain the fur known as Persian lamb. He says: "As soon as a lamb is dropped (it comes into the world with a pretty wavy skin, even without the assistance of art) the inhabitants, to augment its beauty and to make it bring a higher price, sew it up in a coarse linen shirt so as to keep a constant gentle pressure on the wool, pouring warm water on it every day to make it soft and sleek; only letting out the bandage a little from time to time as the animal increases in size, but still keeping it tight enough to effect their purpose, which is to lay the wool in beautiful glossy ringlets, and thereby produce a delicate species of fur which is in great request. By this treatment the fine soft wool which rises in the infancy of the lamb takes a handsome arrangement, and the animal is killed younger or older according to the species of fur intended to be produced—from a short, glossy, satin-like nap to a warm thick fur for a winter greatcoat. The first of these furs in estimation and price is a fine black, like silk damask; an inferior and much thicker black fur comes next; and the lowest in estimation is the whitish, except it be of a very silky appearance and pure colour, in which case it rivals the first."

The Horse.

INSPECTION OF STALLIONS BY THE DEPARTMENT OF AGRICULTURE AND STOCK.

The Department of Agriculture and Stock is prepared to examine stallions for freedom from hereditary diseases, and to issue a certificate for those that are passed by the Government Veterinary Surgeons, free of charge, provided arrangements are made by the local agricultural society, or by other arrangement under which a sufficient number can be gathered at a given place to warrant the expense attending the visit of a surgeon. Stallions can be examined in Brisbane at any time if sufficient notice is given.

These inspections are of great value to those who require the service of a stallion; for, by them, the latter have a guarantee that the resulting young stock will be absolutely sound and free from any hereditary disease.

Following is the official report by Mr. A. H. Cory, M.R.C.V.S., Government Veterinary Surgeon, on the examination of stallions for hereditary unsoundness conducted by him:—

Sir,—*Re* the examination of stallions for hereditary unsoundness. I have the honour to report as follows:—One hundred and sixty-seven stallions were submitted to us for examination up to the 16th instant. Certificates have been issued in respect of 122 horses (about 74 per cent.). (Two stallions under two years of age were also examined and found free from hereditary defects, but certificates have not been issued because of Regulation I.) Forty-three horses have been rejected (about 26 per cent.), owing to unsoundness.

I attach hereto a list of names of stallions which have received certificates.

From the following table showing the various defects of stallions refused certificates, it will be noticed that about 49·09 per cent. of the draught horses were rejected, the chief defect being sidebones (43·63 per cent.). Of the light horses 16·6 per cent. and ponies 9·375 per cent. were rejected.

TABLE SHOWING THE VARIOUS DEFECTS OF STALLIONS REFUSED CERTIFICATES.

Defects.	Draughts.		Lights.		Ponies.		Totals.	
	Number Examined.	Number Certificated.	Number Examined.	Number Certificated.	Number Examined.	Number Certificated.	Number Examined.	Number Certificated.
	55	28*	78	65	32	29	165	122
	Number Rejected.	Percentage Rejected.	Number Rejected.	Percentage Rejected.	Number Rejected	Percentage Rejected.	Number Rejected.	Percentage Rejected.
	27	49·09	13	16·6	3	9·375	43	26·06
Sidebones ...	24†	43·63	1‡	1·282051	...	...	25	15·15
Ringbones ...	1	1·81	1	1·282051	2	6·25	4	2·42
Spavin (bone)	1	1·81	4§	5·1282051	...	...	5	3·03
Curbs ...	1	1·81	4	5·1282051	1	3·125	6	3·63
Whistler (or roarer) ...	...	...	3	3·846153	...	...	3	1·81
Total Unsoundness	27	49·09	13	16·6	3	9·375	43	26·06

* Two stallions not included under 2 years of age.

† Two stallions also affected with ringbones.

‡ Also affected with curb.

§ One stallion also affected with ringbone.

The number of southern horses imported into Brisbane this show time did not appear as numerous as in previous years, but of nine horses imported from one State and submitted for examination, six were rejected. Regulation 5, which deals with rejected stallions being presented a second time for examination, requires some penalty, otherwise we find some owners will not comply with it.

Several horses were submitted for examination, which, in my opinion, were below the standard of breed and conformation desired; in some of these cases a certificate was issued for twelve months, and others were refused a certificate because of unsoundness. It would be of great assistance to the examining veterinary surgeons if the owners of these horses were debarred from presenting them for examination. A refusal to examine should, I consider, be made by a board of competent men, who have made a special study of the various breeds and conformation necessary for pureness of type.

Various shows have been visited during the past twelve months for the purpose of examining stallions, but with the exception of the "Royal," at Toowoomba, and the "National," at Brisbane, owners of stallions have not been very desirous of submitting their horses for examination. Consequently, as the examination at shows has not been compulsory, it frequently occurs that an unsound sire has been awarded a prize. This is a matter which should receive attention.

I would like to mention that Mr. O'Boyle, M.R.C.V.S., and Mr. McGown, M.R.C.V.S., greatly assisted with the examination of stallions at the National Show. Mr. Tucker, M.R.C.V.S., also examined some prior to leaving Brisbane. Our respective initials are inserted in a column for each horse examined

The following are the conditions governing the examination of stallions at present in Queensland:—

1. No stallion under the age of two years shall be granted a certificate. (This will not prevent a veterinary surgeon examining a young horse should he be so desired, but no certificate would be issued.)
2. Certificates for soundness for horses up to the age of six years shall be for season only. At six years and upwards a life certificate shall be given.
3. The veterinary surgeon shall have the right to refuse to examine a stallion if, in his opinion, the animal's conformation renders it unfit for the purpose of a sire.
4. The information obtained by veterinary surgeons in the performance of their duties is regarded as confidential, and no reason for rejection of a stallion shall be given to anyone save the owner or his accredited agent on a request from the former in writing.
5. No stallion once rejected shall be allowed to be presented for examination a second time.
6. It shall be compulsory for owners to furnish the veterinary surgeon at the time of examination with full particulars relating to the identity of the animal, such as breed, pedigree cards, date of birth, height, &c. Owners shall also be informed that it is necessary to accustom their horses to being handled around the legs and feet prior to submitting them for examination, as otherwise, it is practically impossible to examine some stallions.
7. If possible, a loose box should be put up with doors so that the Katoptric test could be applied when examining the eyes. This box should, if possible, be on or adjoining the ground where the horses are to be examined for their wind.

The following defects constitute hereditary unsoundness:—Ringbone, sidebone, spavin (bone), navicular disease, whistling and roaring, cataract, shivering, curb and unsound feet.

I have, &c.,

ARTHUR H. CORY, M.R.C.V.S.,

Government Veterinary Surgeon.

LIST OF CERTIFICATED STALLIONS TO 16TH AUGUST, 1909.

Certificate Number.	Name of Horse.	Age.	Owner.	Address.	Date.	Officer.
	DRAUGHT HORSES.					
90	Baroona Lucifer	5 years	S. P. Cutmore	Swan Creek, Warwick	9-8-9	A. McG.
59	Blue Metal	Aged	J. W. Miles	Wellcamp, Warwick Line	2-8-9	A. H. C.
16	Fairwell	3 years	A. C. C. Rock	Gayndah	2-6-9	A. H. C.
79	John M.P.	4 ,,	T. B. Luckmann	Gorge, Grandchester	6-8-9	H. O'B.
67	King Lyon	6 ,,	J. Gaven	Lonsdale, Warwick	3-8-9	A. H. C.
113	Lord Chelmsford	5 ,,	T. O'Dea	Warwick	9-8-9	H. O'B.
120	Lord Roberts	6 ,,	E. M. Walters	Werribee, Victoria	17-8-9	A. McG.
118	Neotsfield-Quarian	3 ,,	R. Jackson	Eagle street, Brisbane	12-8-9	A. H. C.
66	Piper	3 ,,	J. O'Callaghan	Tattersall's Hotel, Allora	3-8-9	A. H. C.
19	Prince of Pinegrove	6 ,,	Queensland Agricultural College	Gatton	1-7-9	G. T.
49	Rising Sun	4 ,,	M. W. O'Donnell	Bri Bri, Cambooya	2-8-9	A. H. C.
48	Robin Hood	4 ,,	Cecil Roberts	Kingsthorpe, Croxley	2-8-9	A. H. C.
8	Rockstone	3 ,,	J. Doyle	Warwick	25-2-9	A. H. C.
53	Royal Duke	4 ,,	C. F. Turner	Ascot, Inverell, N.S.W.	2-8-9	A. H. C.
47	Royalty	4 ,,	J. O'Callaghan	Arthur street, New Farm, Brisbane	12-7-9	A. H. C.
7	Sir Edward	5 ,,	J. Roach	Australian Hotel, Warwick	25-2-9	A. H. C.
84	Sir Lyon	5 ,,	C. Blackwood	Mullumbimby, N.S.W.	7-8-9	A. H. C.
91	Strong Bow	3 ,,	W. H. Harvey	Montville, Palmwoods	9-8-9	A. McG.
68	Sunrise	5 ,,	M. Baker	Grandchester	3-8-9	A. H. C.
27	Taieri's Pride	4 ,,	F. Hughes	Mount Gravatt, Brisbane	15-7-9	A. H. C.
26	Wealth	5 ,,	F. Hughes	,, ,, ,,	15-7-9	A. H. C.
18	Young Blink Bonney	3 ,,	G. Elliot	Laidley	10-6-9	G. T.
13	Young Dundonald	5 ,,	James Logan, junr.	Rose Farm, Gatton	27-5-9	G. T.
9	Young Hero	4 ,,	Mrs. Hammond	Swan Creek, Warwick	25-2-9	A. H. C.
10	Young Mariner	6 ,,	J. J. Lenihan	Turbot street, Brisbane	5-5-9	A. H. C.
119	Young Master Lyon	5 ,,	T. McKee	Forrest Hill	13-8-9	A. McG.
63	Young Noble	5 ,,	H. W. Herman	Wilsonton, Toowoomba	2-8-9	A. H. C.
61	Young Rob	3 ,,	C. E. Smoothy	Westbrook	2-8-9	A. H. C.
	BLOOD HORSES.					
3 & 29	Antares	Aged	J. Allman	Warwick	25-2-9	A. H. C.
73	Battle Axe	4 years	B. McGovern	Greenmount	5-8-9	A. H. C.
70	Battle Bridge	Aged	Jas. McGovern	Headington Hill, Clifton	4-8-9	A. H. C.
99	Porghese	,,	A. Wienholt	Trustees late B. Williams	9-8-9	H. O'B.
92	Cupid	2 years	Bigge and McConnel	Mount Brisbane	9-8-9	A. McG.
85	Dermos	3 ,,	A. W. Kibble	Tambourine	7-8-9	A. H. C.

101	Dermott Asthore	3 years	C.Q.M.E. Coy., Ltd.	Lake's Creek, Rockhampton	11-6-9	H. O'B.
28	Emancipist	Aged	F. Hughes	Mount Gravatt, Brisbane	15-7-9	A. H. C.
24	Grit	,,	Story and Ramsay	Brisbane	13-7-9	A. H. C.
115	Headlight	6 years	W. Andrews	Nerang	9-8-9	H. O'B.
117	Hector II.	Aged	John Free	Royal Hotel, Brisbane	5-8-9	A. H. C.
106	Ladislas	2 years	Bigge and McConnel	Mount Brisbane	9-8-9	A. H. C.
80	Ladurboy	3 ,,	F. H. Keates	Hendon	6-8-9	H. O'B.
96	Marathon	Aged	F. W. Drew	Chermside, N.C.R.	9-8-9	A. H. C.
100	Our Boy	,,	Austin Brothers	Dugandan	9-8-9	H. O'B.
110	Passion II.	2 years	W. Master	Allora	9-8-9	H. O'B.
108	Pluto	6 ,,	Moore Brothers	Kenilworth	9-8-9	A. McG.
11	Saucy Jack	3 ,,	John Eaves	Hamilton, Brisbane	12-5-9	G. T.
93	Sir Colin	Aged	G. Ahern	Mount View, Conondale, *viâ* Landsborough	9-8-9	A. H. C.
62	Tabandy	,,	J. Lebsanft	Goombungee	2-8-9	A. H. C.
*	Unnamed	6 years	J. B. Shannon	Cockenzie, Mackay	18-8-8	A. H. C.
*	,,	3 ,,	J. B. Shannon	,, ,,	18-8-8	A. H. C.
*	,,	6 ,,	J. Barr	Walkerston, Mackay	18-8-8	A. H. C.
60	Vengeance	3 ,,	D. Horrigan	Bergen, Crow's Nest	2-8-9	A. H. C.
94	Valiant	6 ,,	E. T. Bell	Coochin	9-8-9	A. H. C.

LIGHT HORSES.

40	Abdallah	3 years	W. J. Hill	Kelvin Grove, Brisbane	22-7-9	A. H. C.
4	Antrim Lad	5 ,,	Tim Burgess	Post Office, Warwick	25-2-9	A. H. C.
50	Antrim Lad	5 ,,	D. Loch	Toowoomba	2-8-9	A. H. C.
21	Beldan's Son	6 ,,	T. C. Scadden	Eagle Farm, Brisbane	12-7-9	A. H. C.
30	Berlin King	3 ,,	W. J. Hill	Kelvin Grove, Brisbane	22-7-9	A. H. C.
56	Black Prince	3 ,,	C. Meredith	Russell street, Toowoomba	2-8-9	A. H. C.
78	Count Harold	6 ,,	B. Sinnamon	Avondale, Oxley	6-8-9	A. H. C.
1	Duke of Vermont	Aged	W. C. Thurlow	Red Hill, Brisbane	5-1-9	G. T.
44	Electioneer	5 years	T. A. Collins	Swan Hill, Brisbane	26-7-9	A. H. C.
109	Evolution	3 ,,	J. H. McConnel	Cressbrook	9-8-9	H. O'B.
33	Globecho	6 ,,	C. R. Pickworth	250 Queen street, Brisbane	19-7-9	A. H. C.
34	Globe Second	Aged	J. E. Mullampy	Forbes, New South Wales	19-7-9	A. H. C.
23	Goldspur	,,	W. Macfarlane	North Ipswich	12-7-9	A. H. C.
95	Harold II.	3 years	M. A. Boyle	Short street, Ipswich	9-8-9	A. H. C.
112	Harold Beldan	3 ,,	R. Cocks	Toowong	9-8-9	H. O'B.
45	Harold Prince	4 ,,	Grindles Limited	Rocklea	27-7-9	A. H.
38	Harold's Son	Aged	W. J. Hill	Kelvin Grove, Brisbane	22-7-9	A. H. C.
35	Hopetoun Harold	5 years	H. Brandon	Hill End, Brisbane	19-7-9	A. H. C.
71	Huon-le-Prince	3 ,,	M. W. McDougall	Slade Vale, Warwick	5-8-9	A. H. C.
76	Knight Harold	Aged	J. S. Sinnamon	Moggill, *viâ* Indooroopilly	6-8-9	A. H. C.
41	Lord Nelson	4 years	A. J. W. Simpson	Kelvin Grove, Brisbane	22-7-9	A. H. C.
14	Lord Tracey	4 ,,	G. E. Dent	Reid's Creek, Gayndah	2-6-9	A. H. C.
32	Major Hall	6 ,,	H. Cribb	Ipswich	19-7-9	A. H. C.

LIST OF CERTIFICATED STALLIONS TO 16TH AUGUST, 1909—*continued.*

Certificate Number.	Name of Horse.	Age.	Owner.	Address.	Date.	Officer.
104	Major Harold	3 years ...	J Davidson	Colinton	7-8-9	H. O'B.
81	Master Robin	5 ,, ...	F. P. Belz	Oxley, Brisbane	6-8-9	A. McG.
58	Mel Harold	5 ,, ...	C. W. Mellor	Marburg Hotel, Toowoomba	2-8-9	A. H. C.
5	Palo Alto	Aged ...	F. C. Beeson	Allan, Warwick	25-2-9	A. H. C.
72	Perfection	5 years ...	J. W. Higgins	Russell street, Toowoomba	5-8-9	A. H. C.
89	Plenipotentiary	4 ,, ...	J. H. McConnel	Cressbrook	9-8-9	A. McG.
43	Ribbonwood II.	4 ,, ...	T. Mitchell	Wynnum	26-7-9	A. H. C.
30	Royston	3 ,, ...	G. D. Forrest	,, ...	17-7-9	A. H. C.
17	Secret King	4 ,, ...	W. H. Hinchcliff	Waterworks, Ipswich	10-6-9	G. T.
102	Selkirk	5 ,, ...	Black and Walsh	Westwood	11-6-9	H. O'B.
87	Sir Charles Beldan	3 ,, ..	John Boughen	Rosewood	8-8-9	A. McG.
22	Star Beldan	5 ,, ...	T. C. Scadden	Eagle Farm, Brisbane	12-7-9	A. H. C.
105	Star Harold	Aged ...	E. F. Pickering	Sydney	7-8-9	H. O'B.
75	Sunny Harold	5 years ...	Mrs. C. A. Lohmann	Mudgeeraba, S.C.R.	5-8-9	A. H. C.
57	Tuxana	3 ,, ...	C. Meredith	Russell street, Toowoomba	2-8-9	A. H. C.
69	Venture II.	3 ,, ...	T. Flanagan	Lord John Swamp, Warwick	4-8-9	A. H. C.
77	Viking Junior	4 ,, ...	R. A. Hughes	Eight-mile Plains	6-8-9	A. H. C.

PONIES.

Certificate Number.	Name of Horse.	Age.	Owner.	Address.	Date.	Officer.
20	Bernie	4 years ...	Gavin Wilson	South Brisbane	12-7-9	A. H. C.
36	Bonnie Boy	3 ,, ...	E. Doctor	New Farm, Brisbane	22-7-9	A. H. C.
51	Comet	4 ,, ...	Cecil Roberts	Kingsthorpe, Croxley	2-8-9	A. H. C.
42	Dodger	Aged ...	G. Holmes	Guilford street, Kelvin Grove, Brisbane ...	22-7-9	A. H. C.
114	Frisky Boy	4 years ...	R. Mills	Boonah	9-8-9	H. O'B.
82	General II.	3 ,, ...	J. W. Sinnamon	Oxley, Brisbane	6-8-9	A. McG.
12	Hector	Aged ...	T. W. Cahill	Eagle Farm, Brisbane	19-5-9	A. H. C.
2	Ich Dien	4 years ...	John Mahon	Gatton College	28-1-9	G. T.
31	Jerry	4 ,, ...	L. Hammer	Sandgate	19-7-9	A. H. C.
46	Katefel:o	Aged ...	H. S. Bere	Southport...	24-7-9	A. H. C.
54	Lieutenant Shackelton	5 years ...	J. A. Brumby	Camden Park, Toowoomba	2-8-9	A. H. C.
103	Little Man	Aged ...	Mrs. Fry	Bajool, Rockhampton	11-6-9	H. O'B.
86	Little Model	,, ...	H. Spiin	Rosevale	7-8-9	A. McG.
97	Little Thom	,, ...	H. J. Pocock	Bundamba, Ipswich	9-8-9	A. McG.
65	Llew Llwyd	,, ...	W. Stephens	Brisbane	3-8-9	A. H. C.
25	Lord Hercules	5 years ...	J. Kilroe	Milton, Brisbane	13-7-9	A. H. C.
55	Masher	Aged ...	C. Meredith	Russell street, Toowoomba	2-8-9	A. H. C.
116	Napper	,, ...	F. Hughes	Mount Gravatt, Brisbane	15-7-9	A. H. C.

64	Opal King	Aged	M. J. Kelly	Seaton street, Toowoomba	2-8-9	A. H. C.
111	Phidolphus	6 years	T. J. Higgins	Newstead, Brisbane	9-8-9	H. O'B.
83	Re-echo	3 ,,	B. Sinnamon	Oxley, Brisbane	6-8-9	A. McG.
15	Rocket	3 ,,	F. Sweet	Doorah, Gayndah	2-6-9	A. H. C.
52	Rufus	4 ,,	A. G. Luke	Tantivy, Burnam, Toowoomba	2-8-9	A. H. C.
6	Salisbury Cherub	2 ,,	F. O. Trenkner	Post Office, Warwick	25-2-9	A. H. C.
74	Sandow	4 ,,	S. H. Rowe	Pensilva, Helidon	5-8-9	A. H. C.
88	Squire	3 ,,	W. Keong, junr.	care of Patterson and Co., Rockhampton	9-8-9	A. McG.
107	Thiers	4 ,,	C. B. Nicol	West End Brewery, Brisbane	9-8-9	A. H. C.
98	Tommy	5 ,,	E. Lonergan	Bridge street, Valley, Brisbane	9-8-9	A. McG.
37	The Wonder	Aged	A. C. Lewis	German Bridge, Brisbane	22-7-9	A. H. C.

LIST OF STALLIONS PASSED, BUT NOT CERTIFICATED (UNDER 3 YEARS).

DRAUGHT HORSES.

Name of Horse.	Age.	Owner.	Address.	Date.	Officer.
Banker	Rising 2	Dr. R. McDonald	Ipswich	9-8-9	H. O'B.
Sir Mariner	,, ,,	Walsh and Co.	Toowoomba	2-8-9	A. H. C.

POINTS OF A CLYDESDALE DRAUGHT HORSE.

P. R. GORDON.

Some old friends whom I met at the recent Bowen Park Exhibition—knowing that I took an interest in point judging—urged me to contribute some articles on the subject to the "Agricultural Journal" so that they could be preserved as permanent records. I have selected for this paper the Clydesdale heavy draught horse, and as there has been a recent discussion in the local Press on the true conformation of that horse, this paper may be the means of stimulating further interest on the subject. The diagram at the head of this is copied from a paper on the subject by my life-long friend, the late Mr. Alexander Bruce, of Sydney, whose advocacy of the system is familiar to stock-breeders, not only in Australia, but also in Great Britain and America. I may explain that the values of the different points given are merely suggestive; different breeders' associations may assess the values differently. A matter of greater importance is the proper apportioning of the points so as to ensure that judges and breeders shall not overlook any one point, and the system must prove an education to young breeders and agricultural students. For greater facility in closely criticising a horse the points are grouped. The first three groups, comprising numbers 1 to 7 inclusive, cannot be shown by diagram.

Group I. relates to pedigree, and the points allotted number 16, namely:—

1. "Pedigree."—To be viewed in the light of the standing of the horse in the stud-book. 8 points.

2. "Offspring."—According to records of prizes, gained by the progeny. 8 points.

Group II.—General Character, style and action, 10 points, namely:—

3. "General Character" means beauty of outline and form (in rest) as seen at a glance, and when combined with point indicates high breeding. 5 points.

4. "Style and Carriage."—The natural and unrestrained carriage of the head, neck, and tail, and the movement of the limbs as presented in a state of animation, which, with the preceding point, indicate purity of blood. 5 points.

5. "Action."—This will embrace the action and use (the bending of the knee and hock) of the limbs at the walk and slow trot, in which the difference between a dragging motion and the quick tappy lifting of the feet will be considered. In the trot the action should be free and quick, and in the walk the step should be long, the sole of the foot being almost inverted each time it is lifted. 4 points.

Group III.—Colour and size, 6 points, namely:—

6. "Colour."—According to public taste, the leading colours may be classed according to their estimation as follows:—Bay, dark chestnuts, brown, black, roan, grey; white markings beyond a star are more or less objectionable according to extent. 2 points.

7. "Size."—Height: Stallions, 16½ hands; mares, 16 hands. 4 points.

Group IV.—Head, 10 points, namely:—

8. "Ear," should be active, thin, and generous in length, neither hanging down nor prick-eared. The action of the ear with the eye discloses character. 2 points.

9. "Face."—The head as a whole should be in proportion to the size of the horse. It should be broad between the eyes, with prominent brain development, clean and bony, not loaded with flesh. 2 points.

10. "Eye and Expression."—This organ and the ear show character; and not only the fulness of the eye, but its character must be studied. It should be dark, bright, mild, lively, and truthful, but indicative of plenty of muscular energy. 3 points.

11. "The Jaws."—The jaws should be wide apart to give ample room for the windpipe. 1 point.

12. "The Lips" should be neat and compressed, and not open or hanging down. 1 point.

13. "The Nose and Nostril."—The nose should be straight, or very slightly arched (not dished), and the nostril should be wide, high, and active. 1 point.

Group V.—Forequarter, 14 points, namely:—

14. "The Neck."—This point will include the setting on of the head, the length and shape of the neck, the free development of the windpipe, especially at the throttle and the junction of the neck with the shoulders and breast. It should be somewhat thick, long, and slightly arching in the stallion, and very slightly in the mare when she is in good condition. 4 points.

15. "The Breast" should be sufficiently full and deep to give ample room for the heart and lungs. 2 points.

16. "The Withers" should be rather high to give free action, and should be muscular and sloping (but not so much as in the hackney) evenly into the shoulder. 1 point.

17. "The Shoulders" should be strong and muscular, fairly well laid back, and should rise with a clean and even slope towards the withers. 3 points.

18. "The Foreribs" should be round (hooped), deep, and full. There must be ample room for the heart to beat and lungs to play. Deficient in this, the sire's stock will lack vigour of constitution and pluck. 2 points.

19. "Chest." should be deep and well developed, and should run evenly into the shoulder, not chest-tied. 2 points.

Group VI.—The Middle, 10 points, namely:—

20. "The Back" should be comparatively straight and broad, and not so long as to entail weakness and it should run full and wide into the loin. 3 points.

21. "Backribs" should spring roundly in an arch from the backbone, and run well back towards the hindquarters, *i.e.*, well-ribbed home, and the last ribs should be round and well let down. 2 points.

22. "The Belly" should be fairly let down, but not be pot-bellied, nor too much tucked up, and with sufficient room for food. 1 point.

23. "The Loin" should be full, long, level, and broad, extending along the back to give strength to the horse. 2 points.

24. "The Flank" should be clean, neat, and fairly developed. 1 point.

25. "The Sheath" should be well developed. 1 point.

Group VII.—The hindquarter, 8 points.

26. "The Hips."—The hip bones should be well apart, not protruding, but symmetrical. 2 points.

27. "The Quarter" should be broad and strong, the styfles well apart and wide when viewed from behind, with well-turned buttocks. 2 points.

28. "The Croup" should be long, and comparatively level, but with a proper elevation, gracefully sloping towards the tail. 2 points.

29. "Tail and Set-on."—The tail should leave the croup, and be carried handsomely at the proper height, with free, soft but strong hair. 2 points.

Group VIII.—Legs, &c., 26 points.

30. "Forearm" should be broad, muscular, and well developed. 5 points.

31. "The Knee" should be comparatively large, strong, and clean, with the different members clearly defined. 1 point.

32. "The Thigh" should be broad, well developed, and muscular. 2 points.

33. "The Hock" should be broad in front, strong and clean, with its different members clearly articulated. It should be nearly straight to the ground, but not too straight; the hock when too straight is liable to thorough-pin. 2 points.

34. "The Legs."—The forelegs should be short, straight (not calf-kneed), wide set, well forward (not heavy in the shoulder), and properly proportioned. 3 points.

35. "The Bone" should be comparatively short, stout, but flat and clean (not knotty), broad under the knee and hock, not knee-tied. 1 point.

36. "The Muscle" should be clean, clear of the bone, well defined, and sinewy. 2 points.

37. "Feathering."—Long hair on the back parts of the legs should be neither deficient nor too abundant as spreading round in front; where fine, long, and silky, it is, with a fine skin, indicative of good breeding. 3 points.

38. "The Pasterns" should be rather stout and short, with well developed muscles, and set straight and at the proper angle. 1 point.

39. The feet" should be fair sized, rather large, well shaped, neither too open nor too close at the heels—giving evidence of strength and freedom from internal trouble, and they should be straight and fair, neither turned in nor out at the toes; but better a little in than out. White feet are objectionable, though common. 6 points.

To recapitulate, the various groups will aggregate as under:—

Pedigree and offspring	16	points
General character, style and action ...	10	,,
Colour and size	6	,,
Head	10	,,
Forequarter	14	,,
The Middle	10	,,
The Hindquarter	8	,,
The Legs	26	,,
Total	100	,,

IMPORTED CLYDESDALE STALLION, KING EDWARD VII.

The accompanying illustration depicts the fine Clydesdale stallion, King Edward VII., which was purchased in New Zealand in August, 1908, by the Department of Agriculture and Stock, for use at the Warren State Farm, near Stanwell, in the Rockhampton district. He is rising three years old, and his pedigree is given in the "Queensland Agricultural Journal," October, 1908.

Poultry.

FOWL CHOLERA.

Colonel Pease, Inspector-General of the Indian Civil Veterinary Department, wrote last October to the "Agricultural Journal" of India, announcing the discovery of the cause of the death of some ducks, which was said to be "fowl cholera." All poultry breeders know how fatal this disease is. Whilst studying the "surra" disease in camels, Conductor Dare, at Mian Mir, ascertained, quite accidentally, by microscopic examination, that the death of the ducks was really due to a specific organism of the *Spirochætes* type. It is spread by the agency of the *Argas persicus*, or common fowl-tick, which can only be destroyed by burning out the fowlhouses which they infest. Now, however, that the disease has been traced to this parasite, no doubt a suitable form of treatment will soon be discovered.

Although the destruction of roosts, nests, and even of the infested fowlhouses is at present the only drastic method of exterminating the fowl tick, there need not be occasion for burning fowlhouses, if they are properly constructed of galvanised iron and wire netting with iron roofs and all the needful woodwork excepting roots outside. In such a building fire could safely be applied without destruction of the fowlhouse, and the ticks could not possibly live in the crevices of the heated iron.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

Stations.	1908.					1909.							
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.
North.													
Bowen	0·51	0·96	2·47	0·42	0·42	15·48	4·52	1·06	1·15	2·32	1·98	1·23	0·13
Cairns	2·12	0·74	3·07	1·60	1·41	32·05	5·25	21·03	14·19	1·06	2·48	0 65	2·48
Geraldton	3·66	2·81	6·93	3·80	1·69	47·92	10·29	37·31	28·51	5·98	9·13	6·53	5·32
Gindie State Farm ...	1·27	...	...	...	...	...	...	...	...	...	...	...	...
Herberton	Nil	0·51	1·27	0·61	0·78	12·41	2·28	3·52	0·70	0·81	1·22	0·20	0·75
Hughenden	Nil	Nil	1·67	1·94	1·05	7·55	1·55	2·86	...	Nil	1·71	1·37	0·33
Kamerunga State Nurs.	1·58	...	3·64	1·69	...	...	3·52	...	4·95	0·97	...	...	...
Mackay	0·71	2·27	1·80	2·57	0·02	15·00	1·36	9·00	2·59	2·33	2·05	4·00	0·75
Rockhampton	0·84	0·20	2·14	2·47	1·37	9·01	2·01	1·68	1·21	0·03	1·33	2·99	1·37
Townsville	0·27	0·28	1·58	1·26	0·07	6 94	1·70	7·01	1·28	1·07	1·51	0·83	0·57
South.													
Biggenden State Farm	2·33	1·39	1·80	2·12	3·66	7·37	2·68	2·45	2·00	0·72	2·60	4·01	1·78
Brisbane	2·83	0·67	1·77	2·25	1·28	1·99	2·72	2·65	4·67	0·82	1·75	2·10	2·44
Bundaberg	1·56	1·10	2·39	0·73	3·34	6·52	3·70	5·06	1·54	0·67	1·51	5·65	1·66
Dalby	1·80	1·13	2·55	3·65	1·56	1·46	3·55	0·99	1·60	Nil	1·87	1·19	3·13
Esk	2·75	2·16	1·29	5·99	3·62	2·64	3·21	3·27	5·03	0·36	2·43	2·74	3·31
Gatton Agric. College	2·71	1·84	1·93	5·71	1 29	1·94	5·00	3·18	3·82	0·32	1·22	2·02	2·09
Gympie	2·87	1·37	2·49	2·58	3·97	3·86	3·77	3·41	2·34	1·15	2·96	4·70	2·80
Ipswich	3·23	1·19	1·48	5·09	1·05	1·37	1·95	2·66	4·56	0·05	1·31	1·67	1·34
Maryborough	1·98	1·05	1·84	1·92	1·64	8·36	7·11	2 28	2·4	0·91	2·57	5·02	2·53
Roma	1·38	1·12	2·15	2·79	1·68	5·19	4·85	4·18	1·91	0·44	2·73	1·54	4·83
Roma State Farm ...	0·73	...	...	...	...	...	...	...	...	...	...	...	...
Tewantin	2·70	2·18	2·30	7·50	4·12	6·44	3·31	4·34	9·37	1·00	3·24	4·08	4·24
Warwick	2·99	1·96	0·96	5·28	2·03	0·87	0·82	1·30	2·21	0·70	1·23	2·04	2·28
Westbrook State Farm	1·97	...	...	2·05	...	..	2·61	1·43	...	...	...	...	...
Yandina	2·18	1·50	3·10	6·03	2·75	6·69	6·42	3·71	5·25	1·10	2·70	3·70	5·81

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND,
Divisional Officer.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND AND BRITISH NEW GUINEA.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order RANUNCULACEÆ.

ADONIS, Dill.

Characters those of *Ranunculus*, except that the petals have no nectary, although they are often more deeply coloured at the base, and that the seed is suspended, not erect, in the carpel. The species are few, chiefly from Southern Europe and Western Asia, and have mostly red or straw coloured flowers.—Benth., Brit. Flora.

A. **autumnalis,** *Linn.* Pheasant's Eye, or Flos Adonis. An erect annual, from 8 to 12 in. high or even more on rich soil, glabrous or slightly downy. Leaves finely divided into numerous narrow linear segments. Sepals green or slightly coloured. Petals 5 to 8, rather longer than the calyx, of a bright scarlet, with a dark spot at the base. Carpels numerous and rather large, arranged in a head at first ovate or oblong, but which often lengthens considerably and becomes cylindrical as the fruit ripens. Not uncommon in the cornfields of Southern Europe and Western Asia, and of late has become naturalised on the Jimbour lands. The specimens were received from the Hon. J. T. Bell, M.L.A.

Order RHAMNEÆ.

RHAMNUS, Linn.

Calyx 4 or 5 lobed, broadly campanulate or spreading. Petals hood-shaped, involute or nearly flat, or rarely none. Stamens 4 or 5, scarcely exceeding the petals when present. Disk broadly concave or lining the calyx-tube, with a free margin. Ovary free, sessile on the disk (not immersed), 2, 3, or 4 celled, tapering into a style, with as many short stigmatic lobes as ovary-cells. Drupe succulent, globular or oblong, containing 2 to 4 bony or cartilaginous pyrenes, indehiscent or scarcely dehiscent. Seeds with a smooth testa, albumen fleshy; cotyledons flat or recurved. Shrubs or trees. Leaves alternate, petiolate, penninerved, entire or toothed, usually green on both sides. Stipules small, deciduous. Flowers in clusters, either axillary and solitary or in axillary or terminal racemes. A genus widely spread over the Northern Hemisphere; rare in the Tropics.

R. Alaternus, *Linn.* Buckthorn of Europe. A tall evergreen shrub. Leaves ovate-elliptical or lanceolate, coriaceous, smooth, serrated. Flowers green, more or less diœcious, in short racemes; petals wanting. Berries black. This plant, which is a native of Southern Europe and North Africa, has been used for forming hedges; and I am informed that in some localities near Toowoomba it has strayed into the pasture land, and become naturalised. From one of these strayed plants a specimen was sent me by Mr. H. A. Longman.

Order LYTHRARIEÆ.

LYTHRUM, Linn.

L. paradoxum, *Kœhne,* in Engl. Jahrb. XXIII., Beibl. LVII., 19. Stems hoary-green, 8 to 16 in. long, sub-erect, branching in the upper part. Branches few, sub-erect, slender, angular in the lower part, in the upper part

somewhat winged, linear-lanceolate, sessile or nearly so, 16 to 6 lines long, 1-nerved or penninerved. Pedicels from ½ to 1½ lines long, one to several in an axil or at times two or three on a short peduncle. Accessory calyx-teeth rather large, oval, oblong, or lanceolate, somewhat acute or subobtuse. Petals ovate-rotundate purple. Stamens inserted near the middle of the calyx. Ovary narrow, subcompressed, bisulcate.

Hab.: Interior localities, *Sir Thos. Mitchell.* Found also among some specimens sent by myself to Europe, which, I think, were sent to me by *Mr. H. Weld-Blundell*, of Gordon Downs, and *Mr. Jas. Keys*, of Mount Perry, many years ago.

Order FUNGI.

PHYLLACHORA, Fckl.

F. (Montagnella) rugulosa, *Cooke, Grev.*, XX., 5. On the upper or under surface. Stroma thin suborbicular (1 mm. diam.), black, depressed, rugose, cells with many asci; asci clavate; sporidia lanceolate-triseptate, pale olive, 20 x 6 μ.—Cooke's Handbook of Australian Fungi, 299.

Hab.: On leaves of Eucalyptus, Stannary Hills, *Dr. Thos. L. Bancroft.* Determined at Kew.

PUCCINIA, Pers.

P. Sclerolana, *Mass. sp. nov.* Description not to hand.

Hab.: On leaves of *Sclerolana biflora*, R.Br., Roma, *C. T. White.*

FLORA OF BRITISH NEW GUINEA.

In a packet of specimens recently received from Mrs. H. P. Schlencker, of Boku, British New Guinea, the following I do not find recorded as occurring in the British portion of Papua; hence their publication. The Papuan names are given by the collector:—

Order LEGUMINOSÆ.

TEPHROSIA, Pers.

T. vestita, *Vogel.* Suffruticose, branches densely silky. Leaflets sub-3-jugate, oval oblong, mucronate, under side silky-pubescent. Stipules lanceolate. Racemes shorter than the leaves. Pods silky when young.—Miq. Fl. Ind., Bat. I. (1), 299.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.* The specimen was in bad condition, but I think it must belong to the above, which has been met with in German New Guinea.

Order RUBIACEÆ.

GARDENIA, Linn.

G. papuana, *Bail.* (This name must only be considered provisionary, no specimens or descriptions of some Papuan Gardenias being available for comparison.) Papuan name, Ilu. Leaves very glossy, broadly oblong or ovate, shortly acuminate or obtuse to ovate-lanceolate, 5 to 7 in. long, 3 to 4½ in. broad, more or less tapering at the base; midrib and lateral nerves very prominent, transverse reticulation regular but delicately fine. Petiole about 1 in. long, the upper sides winged by the decurrent lamina. No flowers seen. Peduncle solitary, stout, extra-axillary, angular, about ½ in. long. Fruit ovoid, 1¾ in. long, 1¼ in. diam. Epicarp, ribbed; endocarp, thin; placentas, 5. Seeds flat ovate, about 1½ line long, reddish, minutely tuberculose, glossy. The persistent portion of calyx crowning the fruit is very prominent; tube furnished with horizontal erecto-patent wings about 9 lines long, and 3 lines broad near the base, much tapering towards the apex.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order CONVOLVULACEÆ.

ERYCIBE, Roxb.

E. paniculata, *Roxb.*, **var. coccinea,** *Bail.* Papuan name, Mabela. *See* Ql. Fl., page 1053, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order ACANTHACEÆ.

JUSTICIA, Linn.

J. hygrophiloides, *F. v. M.* Papuan name, Matakila. *See* Ql. Fl., page 1151, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order EUPHORBIACEÆ.

FLUEGGEA, Willd.

F. microcarpa, *Blume.* Papuan name, Guba gau. *See* Ql. Fl., page 1426, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order URTICACEÆ.

PIPTURUS, Wedd.

P. argenteus, *Willd.* Papuan name, Kalaigaramo. *See* Ql. Fl., page 1487, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.* Fruit eaten by natives.

Order FLAGELLARIEÆ.

FLAGELLARIA, Linn.

F. indica, var. minor, *Hook.* Fl. Brit. Ind. VI., 391. Papuan name, Gonea. Stems very slender. Leaves 3 to 5 in. long, $\frac{1}{4}$ to $\frac{1}{2}$ in. broad. Panicles 1 to 3 in. broad. *F. minor,* Blume; *F augustifolia,* Wall. First known from the Malay Peninsula. The Queensland variety, *gracilicaulis,* approaches closely to the above.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.* The natives split the cane and use it for fastening the walls of their houses, &c., or as a substitute for rope.

Order GRAMINEÆ.

PANICUM, Linn.

P. patens, *Linn.* Stem 1 to 3 ft. high, the nodes glabrous, the lower ones rooting, creeping. Leaves ovate to linear-lanceolate, 2 to 6 in. long, 2 to 4 lines broad, thin, finely acuminate; margins and mouth of sheath ciliate below with tubercle-based hairs; ligula rounded. Panicle contracted or effuse, 3 to 5 in. long, usually inclined with spreading capillary branches, which are glabrous or puberulous and naked below, and often long, spreading, and distant. Spikelets scarcely 1 line long. Outer glume from $\frac{1}{3}$ to $\frac{2}{3}$ of the 3rd; ovate obtuse 3-nerved, 2nd and 3rd glabrous or with ciliate tips. *P. accresceus,* Trin.; *P. obliquum,* Roth; *P. radicans,* Retz.—Hook., Fl. Brit. Ind.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

PENNISETUM, Pers.

P. cenchroides, *Rich*. Papuan name, Kamu-Kamu. A tufted grass 1 to 2 ft. high, erect or decumbent and much branched from the base. Leaves 6 to 10 in. long, very narrow, glabrous hairy or villous. Spikes 1½ to 4 in. long, pale or rarely purplish. Peduncle often flexuous; rhachis scaberulous. Involucels subsessile; outer bristles slender, squarrosely spreading; inner twice as long as the spikelets, thickened and ciliate below; filiform, flexuous, and scabrid above. Spikelets 3, polygamous. Outer glume half as long as the 3rd, ovate, acuminate, nerveless; 2nd, half as long as the 4th, ovate, acuminate, 1-nerved; 3rd oblong truncate, 5-nerved, male or sometimes female with an obcordate ovary; 4th, coriaceous, lanceolate, truncate, or cuspidate.—Hook. Flora of British India, VII., 88.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker*. Of this grass an Indian writer upon fodder grasses (J. F. Duthie) says:—"It is an excellent fodder grass for both horses and cattle."

The following plants have been recorded for British New Guinea before, and are only now noticed to record their aboriginal names:—

Triumfetta semitriloba—Kapakau
Alphitonia excelsa—Vege
Derris scandens—Gau mata
Flemingia strobilifera—Kokai
Bauhinia Williamsii—Gefegefe
Rubus rosæfolius—Dema dema
R. moluccanus—Kaulaka
Melastoma malabathricum—Bolala
Randia densiflora—Goiseaga
Mussænda frondosa—Kalai kalai
Uncaria appendiculata—Baioga
Solanum verbascifolium—Sivi sivi
Tecoma Dendrophila—Magi magi
Eranthenum variable—Bairata
Justicia Gilligani—Sura
Premna obtusifolia—Garogaro
Moschosma polystachyum—Loga
Deeringia celosioides—Ivanagagai
Euphorbia pilulifera—Waburi waburi
Mallotus philippinensis—Biluqui
Geitonoplesium cymosum—Fokaketo and Pauma pauma
Seleria scrobiculata—Mamaigwa and Fafa
Pennisetum macrostachyum—Quiva Giguna
Anthistiria gigantea—Tololo
Chrysopogon Gryllus—Gau Gauatabua
Selaginella Palu-palu—Lave-lave of Boku
Lygodium dichotomum—Lobo lobo
Hypolepis papuana—Lade
Aspidium exaltatum—Talulaka
Aspidium molle—Dikuli; also Gerubobo
Pteris moluccana—Gelemagalogoto
Polypodium phymatodes—Fera fera.

During August, just past, Major A. J. Boyd paid a visit to British New Guinea on business unconnected with botany, but, in travelling through the country, my old friend gathered whatever he considered might prove interesting to me in the shape of fruits, flowers, and fungi, a few of which are here mentioned, viz. :—

Bixa Orellam, *Linn.*, forma.—In the common form, the fruit is nearly globular, the present fruit forms an elongated cone. Only fruit gathered. This shrub furnishes the arnotto or anatto of commerce.

Hibiscus esculentus, *Linn.* forma.—The only fruit seen was very much longer than the ordinary form known as Okra, a culinary vegetable.

Thespesia? populnea, *Corr.*—Fruit scarcely matured.

Flemingia strobilifera *R. Br.*—The inflorescence somewhat resembles hops.

Barringtonia? edulis, *Seem.*—Only one fruit seen, no foliage.

Luffa ægyptiaca, *Mill. Dict.*—A bitter gourd.

Tabernœmontania aurantiaca, *Gaudich.*—A handsome small tree.

Quercus Gulliveri, *F. v. M.*—A New Guinea oak.

Lycopodium cernuum, *Linn.*—One of the club mosses.

And the following fungi :—Schizophyllum commune, a large Lentinus, Formes lucidus, and Polystictus xanthopuis, &c., &c.

The Orchard.

THE PREPARING OF DRIED FIGS.

A correspondent writing to the "Agricultural Journal for the Cape of Good Hope," in July, 1907, thus describes his method of drying figs.

The figs should be pressed when fully ripe and spread out, unpeeled, on drying trays in the sun, with a slight powdering of sulphur. After the third day they should be turned daily. When sufficiently dried (after six to eight days), they should be dipped in a boiling solution of brine, 1 lb. of common salt to 10 gallons of water. Then after being spread out in the sun for a few hours, they are ready for packing. A few weeks after submitting his sample thus prepared, a buyer in Capetown offered to take 20 tons if he could supply them.

The report upon the sample stated that all who had seen it agreed that it was excellent in every sense. It is recommended that the figs should be packed in layers in boxes, with a neatly folded lining of white paper. It should, however, be borne in mind that only the best figs should be dried. There is no greater mistake than to suppose that imperfect, inferior fruit will make other than second or third rate produce when dried. Will not some enterprising person make an experiment of drying figs by this method this autumn? The boxes should contain 2, 4, 6, or 8 dozen figs.

Tropical Industries.

TEN YEARS OF RUBBER PLANTING IN THE FEDERATED MALAY STATES.

We extract from the "Philippine Agricultural Review" (May, 1909), the following interesting paper on the rubber industry in the Federated Malay States, taken from the report of the Director of Agriculture for those States, 1907:—

The history of rubber planting in the Federated Malay States is probably unique in the rapidity with which a new cultivation, found to be specially suited to the climate, has been established.

In 1897, rubber estates were less than 350 acres in extent, ten years after they had increased 360 times. In 1902 less than 7,500 acres had been planted; five years after seventeen times that amount was under rubber. Nearly all of this land was virgin jungle previous to its being planted with rubber and had to be cleared before any planting operations could be begun. Nine-tenths of the whole acreage has been cleared and planted by the younger generation of planters, who deserve the greatest credit for the excellent way in which their work has been carried out. The difficulties under which most of them have opened up their estates have been many and varied: bad conditions of health, both for master and coolie, and steadily rising prices for labour owing to local conditions.

At the end of 1906 there were in the Federated Malay States 85,000 acres, at the end of last year 124,580, an increase of about 46 per cent. There were 10,745,000 trees planted in 1906, and nearly 20,000,000 in 1907. The output of dry rubber was nearly doubled, showing 1,028,792 lb., or 459 tons, in 1906, and 1,984,285 lb., or 885 tons, in 1907, an increase of 93 per cent. Since January, 1906, the amount of rubber planted has been trebled, and the whole of that large acreage is in a healthy and vigorous condition.

YIELDS OF DRY RUBBER PER TREE.

The average amount of dry rubber is, over the whole peninsula, 1 lb. 12 oz. per tapped tree.

OVER-PRODUCTION AND SYNTHETIC RUBBER.

The fear of over-production which appeared very large a year or more ago, has, owing to more accurate knowledge of the world's demand for rubber, and the amount produced, to some extent subsided. The drop in prices, while having the effect of reducing the amount of rubber planting, may also to a great extent reduce the output from Brazil, where the margin of profit is much less than in cultivated rubber.

[A reference to rubber prices in Tropical Industries in this issue will show that a boom has taken place lately in rubber, Pará being now quoted at 8s. 5d. per lb., the supply not nearly coming up to the demand.—Ed. "Q.A.J."]

This also should lead not only to a consideration of cheapening of methods of production, but to the possibilities of increasing the demand for rubber. No product lends itself more to measures for improving and widening the market. The almost endless possibilities for the economic use of rubber, and the small proportion of the purchasing population of the world which at present knows and uses rubber, both demonstrate the fact that measures taken to provide new outlets for rubber are much more hopeful than in the case of food or textile products like coffee or copra, which have a comparatively limited number of uses.

It is not to the interest of cultivated rubber that the output of the Brazilian product should decrease very rapidly. There is not yet sufficient cultivated rubber or wild rubber from other sources to supply the increasing demand. Those who look forward to a future for immense areas of cultivated rubber in suitable climates, of which the Malay Peninsula can claim to be the best, believe that cultivated rubber will in time satisfy all the manufacturers in regard to its physical qualities and will be produced in sufficient quantity to meet the world's requirements. It is not easy to foresee the future demands for rubber, but a substance which has made itself so indispensable to all civilised races must be required in increasing quantities, and the fear of over-production may be cancelled, by the quite as likely possibility of the supply not meeting the demand and the consequent resort to other substances as substitutes for rubber.

Is Clean Weeding Advisable.

Weeding on most of the rubber estates in the Federated Malay States is the item costing most annually. This sum is spent on labour, and represents in many cases 70 per cent. or more of the total labour of the estate.

The object of the rubber planter is to obtain as quickly as he can vigorous trees of as large a girth as possible, at the smallest cost, and in order to effect this he keeps his fields as clear of weeds as possible and so allows the rubber-tree to have all the moisture and plant food available in the soil.

That clean weeding will show a better result in the growth of the rubber-trees than allowing all and any weeds to grow continuously, can no doubt be proved. In Perak, however, some of the estates from want of money or shortness of labour have not been able to keep their plantations clear of weeds and have abandoned weeding. In some cases the weeds are checked by being regularly cut, but in others nothing at all has been done to eradicate or discourage the weeds.

The growth of trees on such places is somewhat poorer than trees in similar condition which have been kept free from weeds, but the vigour and girth of the trees where the weeds have been allowed to grow is not so markedly different as the disciples of clean weeding would expect to see.

The belief in clean weeding is a tradition handed down from English farming to tea and coffee planting in the East; good farming is associated with absence of weeds. In Europe, the farmer of cereals and other crops does not practice the method of using certain plants as a substitute for weeds. There are various reasons why clean weeding in such crops is a good policy in Europe, but annual crops have to be treated differently from permanent cultivations, and the conditions of labour, cultivation, plant growth, and especially climate are entirely different in the tropics from those in temperate climates and consequently methods have to be modified.

The objections to clean weeding in rubber cultivation in the Federated Malay States and removal of all protection from the surface of the soil are that it allows a large amount of percolation of heat radiation and of evaporation of moisture, also that heavy rainfall on all but flat surfaces always results in the constant removal of very large quantities of top soil, which are either carried away in streams or transferred to the drains. It is not easy to estimate the loss that takes place in tropical climates where the soils are allowed to remain exposed and frequently scraped. An immense amount of plant food is continually lost through percolation and drainage; the greater part of this is absorbed by the roots of any plants growing on the surface; and when the leaves and stems of these plants are cut this is to a great extent returned to the soil.

With the soil protected from the rays of the sun the conditions of moisture and temperature are most favourable to the development of bacteria which are responsible for the liberation of plant food. In clean weeded land

the top 2 in. or more of soil are, because of admission of heat and light, made impossible for feeding roots and the preparation of food for them. When the ground is covered this surface layer is kept moist and useful for the feeding roots. A considerable area is thus added to the area of soil available for rubber roots and the growth of the trees is improved.

In addition to arguments for clean weeding there is a local one, the danger of the ground being taken possession of by "lalang" (*Imperata arundinacea*), a pestilent weed, which once allowed to invade a plantation can only be eradicated at enormous expense. This plant is ubiquitous, is always one of the first to cover newly-opened land, and by far the most difficult weed to eradicate.

The experience gained in the use of tapioca as a catch crop in rubber, which obtains on some thousands of acres of rubber showing excellent growth, is another argument in favour of keeping the soil covered up. Few, if any, crops take more from the soil than tapioca, but this loss of valuable plant food in the soil is, to a great extent, compensated for by the advantage of keeping the soil from the sun and rain. The girths of young trees grown with tapioca are, in many cases, as large as those of trees in similar land, clean weeded, and without any other crops. . . . . Weeding entails a probable cost of 100,000 dollars before the rubber is in bearing. (This is on a 1,000-acre estate.) In labour it represents a continual force of about 250 coolies working for 300 days in the year.

The author goes on to suggest three plants suitable for planting amongst the rubber trees as a substitute for weeds which will reduce the wages bill without reducing the rapidity with which the rubber-trees will grow. These three plants belong to the order Leguminosæ and are:—*Crotalaria striata*, *Mimosa pudica*, and *Desmodium triflorum*.

RUBBER MACHINES.

The number of estates which have trees of sufficient growth for tapping is as yet not very many, but each year more become productive, and the question of the best and most economical machinery for preparing rubber for the market and for cleaning "scrap," "bark," and "earth" rubber is one of the most important in the profitable working of an estate.

Dr. Kuhleman, chemical adviser to one of the largest rubber manufactories in Germany, paid a visit recently to this country to acquaint himself with the methods of the planter in his preparation of rubber. He was impressed by the care which is universally taken to ensure the purity and cleanliness of the rubber sent home.

In asking his advice upon the plant used by the planter, Dr. Kuhleman informed me that one point which he noted was, that the washers and rollers, in use on estates were very short in length. This was the case in the beginning of the manufactories in Germany. Machines with narrow rollers were at first put up, and then when these could not deal with the amount of rubber required, more were added, but it was soon found more economical to have one roller of 10 ft. long than five of 2 ft. It will be well that planters should in making arrangements for their rollers and washers look ahead to the time when they are producing much larger quantities of rubber than at present. The machines at present in use are, for dealing with a large quantity of rubber, mere toys and will either have to be multiplied or larger machines put in.

The longer rollers have an advantage over the short ones, at present in use, in that the risk of oil reaching the rubber from the bearings as it passes through the rollers is decreased. Rubber prepared in a number of small-length machines will be in more danger of being discoloured at places than that prepared in fewer and longer rollers. The length of rollers in rubber-washing machines used in factories in Europe is often 12 ft., whereas, as a rule on estates in the Federated Malay States, two or more rollers of not more than 1 ft. in length are often used.

Preparation of Rubber for the Market.

Block rubber, the advantages of which for packing, transportation and preservation are undoubted, has not commended itself generally to the planter. Until large quantities of any of the forms of rubber produced in Malaya—viz., block, crêpe, and sheet, are put on the market, it will not be possible to settle the much-vexed question as to the advantages of each. The sale at a big price, of a shipment of any of these forms, at once produces the impression that that special form is more attractive to buyers and will command better prices, but it should be remembered that the quality of the rubber as well as the shape in which it is sent is a factor, and the most important factor, in determining its market value. In whatever form it is sent it is of the most vital importance that planters should continue to aim at the purest and cleanest rubber. The manufacturers have begun to realise the advantages of the freedom from impurities which Eastern plantation rubber possesses, and this good opinion is too valuable to be endangered by using less care in preparation.

Rubber Seed for Oil Manufacturing Purposes.

Rubber seed, both with the husk on and decorticated, has been sent to the Imperial Institute and to various commercial firms dealing in such products in Europe and Australia, in order to introduce this article to them with a view to a future market.

The oil from the seed is a drying oil not unlike linseed oil in appearance and smell, and probably will prove as good as, if not better than, the latter oil in manufacture of paints and varnishes. Manufacturers or dealers wishing to have samples of the seeds either decorticated or in the shell should communicate with the Department of Agriculture, Federated Malay States. A profit per acre after paying all expenses of picking, husking, packing, and shipping of at least 5 dollars to 8 dollars may be earned on estates with trees in full bearing. While the demand for considerable quantities of seed for planting purposes continues, this method of disposing of seed is very much more profitable than the sale for oil, but with an immense number of trees producing fruit the supply for planting purposes will soon greatly exceed the demand and an additional market is needed. If the seeds are left on the ground they germinate freely and money must be spent in weeding out the young plants.

The questions in regard to the best methods of preparation and packing of the seed in exporting it for oil purposes continue to engage the attention of the Department of Agriculture, and a further report will be issued.

RAMIE FIBRE.

The great hindrance to the extension of this fibre as a textile material has been the difficulty hitherto experienced in separating the fibre from the juices and woody substance of the stalks, "decortication" as the operation is termed. Many attempts have been made to solve the problem, but it would appear from the following extract from the "Textile Mercury" of 12th June, 1909, that at last a practical process has been discovered. If this should be so the cultivation of the Ramie plant (*Bœhmeria nivea*) will probably undergo very considerable development. A few plants are being grown in the Government Garden, Larnaca, and as these are doing well, they will be propagated in due course.

In regard to the new Smith ramie degumming process, the United States Consul-General at Shanghai writes that the operation is simple and lasts only ten minutes. The ramie is first placed in a vessel containing boiling water, to which is added a secret composition. After boiling four and a-half

minutes, it is washed, bleached, and thoroughly degummed. A decorticating machine has also been invented by Mr. Smith, which is claimed to do all the work now done in the fields by hand, except cutting and carting.

From the same journal we learn that in Sierra Leone 60 acres of ramie have been planted and are promising well, and that there will this year be an area of 260 acres under ramie in that colony, and that two decorticating machines are being put up.—"Cyprus Journal."

[Should the Smith process prove to be a practical success, a new source of profit will be opened up for Queensland farmers. The Ramie plants succeed admirably in this State, and come to maturity within a year. Those who have Ramie plants will have no difficulty in disposing of them at high prices, should the new process be proved successful.—Ed. "Q. A. J."]

Times of Sunrise and Sunset at Brisbane, 1909.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6 3	5·33	5·29	5·47	4·58	6·5	4·46	6·28
2	6·2	5·34	5·28	5·48	4·58	6 6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·35	5·26	5·49	4·56	6 7	4·46	6·30
5	5·59	5·35	5·25	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·24	5·49	4·55	6·9	4·46	6·32
7	5·57	5·36	5·22	5·50	4·54	6·9	4·46	6·32
8	5·55	5·37	5·21	5·50	4·54	6·10	4·46	6·33
9	5·54	5·37	5·20	5·51	4·53	6·11	4·46	6·34
10	·53	5·38	5·19	5·52	4·52	6 12	4·46	6·34
11	5·52	5·38	5·18	5·52	4·52	6·12	4·46	6·35
12	5·51	5·39	5·17	5·53	4·51	6·13	4·47	6 36
13	5·50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4 50	6·15	4·47	6·37
15	5·47	5·40	5·14	5·55	4 50	6·15	4·47	6·38
16	5·46	5·40	5·13	5·55	4·49	6·16	4·47	6 38
17	5·45	5·41	5·12	5·56	4·49	6·17	4·48	6·39
18	5·41	5·41	5·11	5·56	4·49	6·18	4·48	6·39
19	5·43	5·42	5·10	5·57	4·48	6·18	4·48	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·49	6·41
21	5·41	5·43	5 8	5·58	4·47	6 20	4·49	6·41
22	5·39	5·43	5·7	5·59	4·47	6·21	4·50	6·42
23	5·38	5·43	5·6	5·59	4 47	6·22	4·51	6·42
24	5·37	5·44	5·5	6·0	4·46	6·23	4·51	6·43
25	5·36	5·44	5·4	6·0	4·46	6·23	4·52	6·43
26	5·35	5·45	5·3	6 1	4·46	6·24	4·52	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6 2	4·46	6·26	4·54	6 44
29	5·31	5·46	5·1	6 3	4·46	6·26	4·54	6·45
30	5·30	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

Phases of the Moon.

			H. M.
7 Sept.	☽	Last Quarter	5 44 a.m.
15 ,,	●	New Moon	1 0 ,,
23 ,,	☾	First Quarter	4 31 ,,
29 ,,	○	Full Moon	11 5 p.m.
6 Oct.	☽	Last Quarter	4 44 p.m.
14 ,,	●	New Moon	6 13 ,,
22 ,,	☾	First Quarter	5 4 ,,
29 ,,	○	Full Moon	8 7 a.m.
5 Nov.	☽	Last Quarter	7 38 a.m.
13 ,,	●	New Moon	0 18 p.m.
21 ,,	☾	First Quarter	3 29 a.m.
27 ,,	○	Full Moon	6 52 p.m.
5 Dec.	☽	Last Quarter	2 12 a.m.
13 ,,	●	New Moon	5 59 ,,
20 ,,	☾	First Quarter	0 18 p.m.
27 ,,	○	Full Moon	7 30 a.m.

Science.

ANALYSES OF QUEENSLAND CHEESES.

By J. C. BRÜNNICH, Chemist to the Department of Agriculture and Stock.

Average samples of the cheeses obtaining prizes at the last Exhibition of the National Agricultural and Industrial Association of Queensland held in Brisbane, were obtained for analysis, and the results are herewith given in tabulated form. For a comparison the average analysis of a large number of English and American Cheddar cheeses made by various analysts, also the analyses of a special sample of Cheddar cheese made at the Agricultural College, at Gatton, and tested at the age of two and four months, and again some other cheeses of the Exhibition, one a particularly fine sample of white cheese which did not get a prize, and another cheese classed as bad on account of too much acidity, are given on the same table.

The most striking feature of our Queensland Cheddar cheeses is the large amount of fat which they contain, and there can be no doubt that this is a drawback, particularly if cheeses are intended for export. A cheese poor in fat would, however, be even worse, and, I believe, in England, complaints are made about the low fat contents of some of the New Zealand cheeses. In England and America the fat in Cheddar cheeses varies between 23 and 33 per cent., with an average 29·2 per cent. An excellent sample of Cheddar cheese, of Scotch manufacture, specially imported for comparison, contained 32·7 per cent. moisture, 32·9 per cent. fat, and 1·35 per cent. salt.

A cheese containing about 33 per cent. of fat may be the most suitable for export. The American standard for whole milk cheese is that they should contain in the water free substance not less than 50 per cent. of butter fat. A cheese with 30 per cent. of moisture should, therefore, contain not less than 35 per cent. of butter fat. All our cheeses go over this standard, some are considerably higher, and all the analyses of English and American Cheddar cheeses which I have come across are below this standard.

The acidity of the cheeses expressed in percentage of lactic acid varies but slightly, but it will be noted that the first prize, and highest number of points, goes to the cheese with the least amount of acidity. But even the cheese classed as bad on account of high acidity, contains only the same amount of acid as the average of English Cheddar cheeses.

The soluble nitrogen in cheese is an indication of ripening, and here we find again that the two first prizes went to the cheeses with the smallest amount of soluble nitrogen. If the prizes are a true indication of our popular taste with regard to cheeses, it will be clearly seen from a study of the analyses (more particularly the values of insoluble nitrogen, insoluble proteins, and proteins), that the more properly ripened, and, therefore, much more digestible cheeses do not get the place they deserve, and that our popular taste will have to be educated to such products. It must be pointed out, however, that in accordance with our Commonwealth standard for cheeses only one of the Exhibition cheeses, in accordance with the points awarded by the judge, came into the second class (requiring 75 to 85 points), whereas the remainder are all third class (under 75 points).

If this low classification of the cheeses was justified, it cannot be attributed to the raw material, the milk, which is of excellent quality, clearly shown by the good chemical composition of the cheeses, but it must be entirely due to faulty manipulation. The manipulation of milk and general manufacture must be improved if we wish our cheeses to get a good position in the world's markets.

EXHIBITION CHEDDAR CHEESES.

—	Large Cheeses.			Loaf Cheeses.			White Cheese.	Bad. Too Acid.	Cheddar Cheese from Agricultural College, Gatton.		Average of English and American Cheddar Cheeses.
No. ...	109	122	114	149	148	145	111	125	2 Months	4 Months.	
Prize ...	1st	2nd	3rd	1st	2nd	3rd	...	...			
Points ...	78	74	72	74	72	70	...	...			
	%	%	%	%	%	%	%	%	%	%	%
Moisture ...	35·45	34·55	33·72	31·48	29·06	30·75	29·06	26·63	31·59	27·63	30·5
Acidity as Lactic Acid ...	·90	1·11	1·17	1·24	1·22	1·36	1·22	1·44	1·41	1·47	1·44
Fat ...	34·36	34·91	33·51	36·36	36·96	39·09	36·96	39·08	35·25	37·51	29·2
Total Nitrogen ...	3·90	4·12	3·79	3·79	4·16	3·71	4·16	4·05	3·95	4·20	4·20
,, as Ammonia ...	·04	·07	·08	·06	·07	·03	·07	·11	·03	·05	·05
Soluble Nitrogen ...	·89	1·28	1·33	·92	1·46	1·06	1·40	1·54			
Precipitated Soluble Nitrogen ...	·70	·77	·63	·68	·63	·85	·57	·70			
Nitrogen as Ammonia ...	·04	·07	·08	·06	·07	·03	·07	·11	·03	·05	
Do. as Amides ...	·15	·44	·62	·18	·76	·18	·76	·73	·31	·75	
Do. as Albumose and Peptones ...	·70	·77	·63	·68	·63	·85	·57	·70	·88	1·03	
Do. as Insoluble ...	3·01	2·84	2·46	2·87	2·70	2·65	2·76	2·51	2·72	2·37	
Proteins ...	19·21	18·12	15·70	18·32	17·23	16·91	17·61	16·02	17·35	15·11	
Primary Products of Ripening ...	4·47	4·92	4·02	4·34	4·02	5·42	3·64	4·47	5·29	6·40	
Secondary ,, ,, ,, ...	1·1	3·2	4·4	1·5	3·3	1·3	5·3	5·4	2·35	5·94	

General Notes.

AGRICULTURAL COLLEGE EX-STUDENTS' CLUB.

The annual dinner of the Gatton Agricultural College Ex-students' Club was held at Café Eschenhagen on Thursday evening, 12th August.

The president of the club, Mr. J. Mahon, occupied the chair, and presided over a gathering of about fifty ex-students.

A number of apologies were received.

The Minister, Under Secretary, Mr. J. P. Orr, Mr. Quodling, Mr. Pound, Mr. Jones, and College officers were also present. The following ex-students were present:—D. J. Binnie, Meringandan; H. C. Webb, Ipswich; T. Wilson, Ipswich; R. H. Bentley, South Brisbane; P. V. Campbell, Glen Innes, N.S.W.; R. K. Moore, South Brisbane; A. B. Morrison, Brisbane; J. Reed, Gatton College; J. Markwell, Cooroy, N.C.L.; R. Gray, Wetheron; T. Nuttall, Rockhampton; E. R. Isaacs, Tweed River, N.S.W.; F. E. Walker, Woolooga; A. E. Dyne, Gympie; M. Edwards, Brisbane; F. E. Harding, Kannungar; B. Whitehouse, Laidley; C. Bath, Cambooya; E. A. Byrne, Brisbane; J. P. Purcell, Atherton; J. W. Devereux, Beaudesert; N. J. Dixon, Toowong; R. T. Harvey, Allora; W. P. Campbell, Albion; F. Fifett, Woombye; O. P. Hardgrave, Wellington Point; E. P. Noakes, Childers; J. W. Evans, Rosewood; R. J. Ralfe, Brisbane; M. Shield, Cooinda; K. D. Moffat, Barcaldine Downs; E. H. Wall, Stapleton; R. Baker, Gympie; H. C. Chambers, Warwick; E. F. Youngman, Gatton College.

The usual toast list was honoured, and altogether an enjoyable evening was spent.

The secretary (Major Boyd) was unable to be present, having gone to New Guinea.

The dinner over, the annual meeting was held.

Mr. Mahon was re-elected president, and the committee elected for the coming year were:—H. Webb, N. Dixon, B. Whitehouse, J. Devereux, F. E. Harding, G. L. Wilson, and E. F. Youngman, secretary *pro tem.*

Mr. W. P. Campbell was elected a member of the committee, but, owing to business engagements, he was reluctantly compelled to withdraw his name.

During the meeting Mr. Scriven intimated that he was prepared to offer a steam boat for a river trip in connection with next year's dinner, as he was desirous of seeing the club become worthy of the institution. Needless to say that the offer was gratefully accepted, and the hearty thanks of the members were conveyed to Mr. Scriven. This should prove a regular "lift out" for the committee, and next year's gathering should beget wider interest and deeper appreciation of the objects of the club.

A distinct feeling of comradeship was noticeable amongst the members, who unanimously acknowledged the many benefits they had derived from their connection with the College.

The State, without doubt, has laid itself out in a practical manner to assist its young men to make the most of their glorious heritage. During the present year all ex-students will be communicated with and a full membership solicited.

Next year's gathering should be well attended and ex-students would do well to keep this event in their minds.

The main reason for the establishment of the club, is to keep all those who have received their agricultural training at the College in intimate

touch with each other, and every facility is given by the Department of Agriculture, with the hearty co-operation of the Principal and Officers of the College, to attain this end. We would, therefore, impress upon all present students that they should consider it a duty, on completion of their College course, to become members of the club. The subscription of 5s. per annum is so small, that the monetary consideration is a mere trifle compared with the advantages to be derived from affiliation. The Department, it should be mentioned, has placed a room at the disposal of members, who, when in town, can freely make use of it, as well as of the extensive library replete with literature from all parts of the world, whence information can be gained concerning all the industries in which the members may be engaged.

AUSTRALIAN BUTTER BOXES.

Made from Straw Pulp.

Some interest was taken in a brief reference published recently in these columns respecting butter boxes made of straw in Queensland. The butter box referred to, we ("Commercial Intelligence") now learn from the Canadian Trade Commissioner at Melbourne, is that about to be made under a patent process held by the Clarazite Manufacturing Company, Limited, 31 Queen street, Melbourne. It is stated that the machinery was obtained from a firm in Manchester. The value of the machinery, now in course of erection, is given at over £4,700, but it is premature to express an opinion as to the capacity of output of the plant. The patent rights for Australia are valued in the balance-sheet of the company at 25,500 shares, each of £1.

It is claimed for this straw pulp butter box that it is odourless and impervious to moisture, and the various tests made indicate satisfactory results. The few sample boxes made show a strong paper material of great strength and easily nailed. The colour is dark grey, and hence not so attractive as the ordinary butter box used in Australia, made from New Zealand white pine—a wood singularly well adapted for the purpose.

Owing to the steady advance in price of wood boxes the company anticipates a big demand for the straw pulp boxes, which will be sold at a figure considerably less than that now charged, but the price has not yet been fixed. While those interested in this new industry are enthusiastic about their prospects, other opinions are expressed to the effect that the process is crude and impractical, and that the project is doomed to failure. An intimation has been given that the first quantity of boxes made will be placed on the market this month (June).

Butter Boxes from Indurated Fibre.

We learn from the same source that Australian and New Zealand patents are held in Melbourne for the manufacture of butter boxes made from waste paper of indurated fibre. The patentees are endeavouring to interest capitalists and to form a company to exploit the market, which in the Commonwealth yearly requires over 1,000,000 butter boxes.

The sides and bottom of the indurated fibre box are moulded in one piece and the lid is fixed with nails. The cost is much less than the ordinary wood box and it can be made quite as strong. Tests were made some time ago at the Government cool stores, Melbourne, by opening up some butter packed for several months in indurated fibre boxes, with the result that the quality was unimpaired and free from the slightest trace of taint. If further details are required they will be supplied on application to the Indurated Fibre Company, 365 Collins street, Melbourne.

RUBBER AND COTTON MARKET.

Following are the prices for Pará and other rubbers, and Sea Island cotton quoted in the West India Committee Circular (the official organ of the West India Committee), 3rd August, 1909:—

Rubber.—Market very firm and few sellers. Hard fine Pará: On spot, 8s. 5d.; October-November, 7s. 6d.; December-June, 7s 0½d.; soft cure, 7s. 10d.: plantation sheets, 8s. 5d. to 8s. 6d. Bolivian: Fine, 8s. 6d. Peruvian: Fine, 8s. 4½d. Caucho: Ball, 4s. 9d.; slab, 3s. 8d. Mollends: Fine, 7s. 5½d. Negroheads: Scrappy, 5s 2d.; Islands, 3s. 3d.; Cameta, 3s. 10d.; Mollends, 4s. 4d. Receipts at Pará, 1,100 tons.

Cotton.—During the fortnight ended 29th July, 131 bales of British West Indian were imported into the United Kingdom. Messrs. Wolstenholme and Holland report that a good business has been done in West Indian Sea Island cotton. About 450 bales have been sold, including—Barbados, 13½d. to 15d.; Antigua, St. Martin, and St. Croix, 13d. to 13¾d.; St. Lucia, 15d.; and St. Vincent, 13d. to 19d. Stains, from various islands, realised 7d. to 8½d. Prices remain firm, and the unsold stock does not amount to more than 100 bales.

COTTON-BALING METHODS.

The accompanying two illustrations, which we take from the "Natal Agricultural Journal," showing cotton-baling methods, will be interesting to Queensland cotton shippers. "The photos." (says the "N. A. J.") "were taken at the docks of the Manchester Ship Canal Company, and are of particular interest in view of the fact that the Egyptian method of baling cotton is to be adopted in America in future. The pictures show cotton from Egypt nicely baled and offering a distinctly more marketable appearance than the American product."

[The former method was always adopted during the years when large quantities of cotton were shipped from Queensland, and now also since cotton has once more come to the front in this State.—Ed. "Q. A. J."]

REPUTED CURE FOR REDWATER.

The malignant disease of redwater in cattle (writes the "Standard," England), which renders some sub-tropical regions all but impossible for cattle-rearing, is said to be absolutely conquered by injections of trypan blue, a drug which poisons the parasites of the malady and is afterwards thrown off by the cattle without injury to the system. Redwater occasionally troubles English farms, but is rare; it is South Africa which hopes especially to benefit from the new treatment.

Answers to Correspondents.

WARTS IN CATTLE.

D. K. CAHILL, Esq., Peachester.—

Your letter of the 24th ultimo to the Editor of the "Agricultural Journal," on the subject of warts in cattle, was, in the absence of the Editor of the journal, referred to the Principal Veterinary Surgeon and Bacteriologist, Mr. S. Dodd, F.R.C.V.S., who has replied to same as follows:—

In some parts of the State warts are very prevalent on cattle, sometimes covering almost entirely the whole skin, although the head seems to be the favoured seat for these. If the warts are few in number on the calves, there are various ways of dealing with them. If they have a stalk the best way is to tie a piece of silk, thread, or any similar material, round the base of the wart near the skin, tightly, tightening the thread every day. This will eventually strangulate the wart and cause it to drop off. Where there is no stalk, the wart can be treated by lightly touching it with nitric acid, once or twice a week, taking great care that the acid does not touch the sound skin and that there is no possibility of the animal licking the mixture. The scab that forms should be lightly removed and the part retouched at regular intervals. In some cases these warts can be burnt off with a hot iron, but this requires care and depends upon the situation and character of the former.

MILK-TESTING AND TESTS.

A. W. ALLEN, Pratten.—

A four-bottle machine with all appliances needed to test milk or cream will cost about £2 10s. in Brisbane, and may be obtained from Messrs. Waugh and Josephson or Messrs. Brown, Webb, and Co. A composite sample taken for three days should suffice and give you an accurate estimate of the value of each cow's milk. Several such tests should be made during each animal's lactation period, and an average test struck.

Preservative in the composite sample bottles will be required—about 2 or 3 drops of formalin, or a small teaspoonful of boracic acid will answer for that purpose.

With regard to your question *re* fodder influencing the percentage of butter fat in milk, we may, later on, find space to discuss this matter, which will necessarily involve considerable work. We shall be pleased to hear from you as to your experience on this point.

MANURE FOR PUMPKINS.

PUMPKIN SQUATTER, Yandaran.—

Pumpkins require a soil rich in humus, and organic matter should be supplied in the form of farm-yard litter, green manuring, &c.

Apply also 3 to 4 cwt. of Shirley's No. 3 manure, which supplies all the necessary constituents.

WARTS ON CATTLE—NINETY-DAY MAIZE—PAPAW JUICE.

FARMER, Cardwell.—

1. *See* answer to D. K. Cahill on "Warts in Cattle."

2. Yes. You may obtain Ninety-day Corn either at Biggenden or at the Hermitage State Farm.

3. You may safely plant corn at Cardwell.

4. For information on papaw juice, write to Alfred Buckley, manager of the Papawline Manufacturing Company, Red Hill, Brisbane.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	AUGUST. Prices.
Apples (Hobart), per case	...
Apples (Victorian), per case	...
Apples (Local), per case	10s. to 12s.
Apples (Cooking), per case	8s. to 9s.
Bananas (Cavendish), per dozen	...
Bananas (Sugar), per dozen	...
Cape Gooseberries, per quarter-case	5s. to 8s.
Custard Apples, per quarter-case	4s. to 7s.
Lemons, per case	5s. to 6s.
Lemons (Sydney), per case	...
Mandarins, per case	4s. to 8s.
Oranges, per case	3s. to 4s.
Oranges (Local), per case	...
Papaw Apples, per quarter-case	1s. 6d. to 3s.
Passion Fruit, per quarter-case	3s. 6d. to 4s.
Pears, per case	4s. to 5s.
Pears (Hobart), per case	...
Pears (Victorian), per case	...
Persimmons, per box	6s.
Pineapples, Ripley Queen, per dozen	4s. 6d.
Pineapples, Rough, per dozen	1s. to 3s.
Pineapples, Queen, per dozen	3s. to 4s. 6d.
Rosellas, per sugar bag	...
Strawberries, per tray	1s. 6d. to 2s.
Tomatoes, per quarter-case	4s. to 5s. 6d.

SOUTHERN FRUIT MARKET.

Article.	Prices.
Apples (Eating), per case	5s. to 8s. 6d.
Apples (Victorian), per case	...
Apples (Local), per case	...
Apples (Cooking), per case	5s. to 6s.
Bananas (Cavendish), per dozen	2d. to 2½d.
Bananas (Sugar), per dozen	1½d. to 2d.
Cocoanuts, per dozen	1s. 9d. to 2s. 6d.
Lemons, per case	7s. to 8s.
Lemons (Italian), per half-case	...
Mandarins (Emperors), per gin case	7s. to 7s. 6d.
Mandarins (Medium), per gin case	3s. 6d. to 4s.
Oranges, per case	7s. to 7s. 6d.
Oranges (Navel), per case...	9s. to 10s.
Passion Fruit (Choice), per half-case	4s. to 4s. 6d.
Peanuts, per lb.	5½d.
Pears (Choice), per packer	12s. to 15s.
Pears (Medium), per packer	10s. to 11s.
Persimmons, per box	...
Pineapples (Queensland), Ripley Queen, per case	6s. to 7s. 6d.
Pineapples (Queensland), Choice, Queen, per case	5s to 6s.
Pineapples (Queensland), Choice Common, per case	6s. to 7s. 6d.
Quinces, per gin case	...
Rock Melons, per dozen	...
Strawberries (Queensland), per 3-quart tray	3s. to 4s.
Tomatoes (Queensland), per quarter-case	3s. to 3s. 6d.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR SEPTEMBER.

Article.		SEPTEMBER. Prices.
Bacon, Pineapple	lb.	7½d. to 9d.
Barley, Malting	,,	3s. 6d. to 3s. 9d.
Bran	ton	£4 15s.
Butter, Factory	cwt.	104s. to 108s.
Chaff, Mixed	ton	£4 10s. to £4 15s.
Chaff, Oaten	,,	£4 10s. to £4 17s. 6d.
Chaff, Lucerne	,,	£4 to £5.
Chaff, Wheaten (Straw)	,,	£2 to £2 10s.
Cheese	lb.	5d. to 5½d.
Flour	ton	...
Hay, Oaten	,,	£5 5s. to £5 15s.
Hay, Lucerne	,,	£3 10s. to £4 10s.
Honey	lb.	2½d. to 2¾d.
Maize	bush.	3s. 6d.
Oats	,,	3s. 3d. to 3s. 4d.
Pollard	ton	£5
Potatoes	,,	£4 to £8 5s.
Potatoes, Sweet	,,	£3 to £4.
Pumpkins	,,	£1 to £3.
Wheat, Milling	bush.	5s. 9d.
Wheat, Chick	,,	5s. 6d.
Onions	ton	£8 10s. to £9.
Hams	lb.	11d. to 1s. 1½d.
Eggs	doz.	7¼d. to 8¼d.
Fowls	pair	4s. to 6s.
Geese	,,	7s. 9d. to 8s.
Ducks, English	,,	4s. 6d. to 5s. 4d.
Ducks, Muscovy	,,	5s. to 6s. 6d.
Turkeys (Hens)	,,	10s.
Turkeys (Gobblers)	,,	13s. to 18s.

ENOGGERA SALEYARDS.

Animal.	AUGUST. Prices.
Bullocks	£8 2s. 6d. to £9 5s.
,, (single)	£15
Cows	£6 5s. to £8 2s. 6d.
Merino Wethers	20s.
Crossbred Wethers	20s. 3d.
Merino Ewes	15s. 6d.
Crossbred Ewes	22s. 6d.
Lambs	17s. 3d.
Pigs (Porkers)	30s. 6d.

PRICES OF STOCK IN THE BRISBANE MARKETS FOR AUGUST—*continued.*

EXHIBITION.

Animal.	AUGUST. Prices.
Bullocks	£19 5s.
" (Champion)	£18 15s.
" (Guessing)	£28 5s.
Cows	£8 15s.
" (Champion)	£12
Merino Wethers	26s. 6d.
C.B. "	31s. 6d.
Merino Ewes	23s.
C.B. "	22s.
Lambs	20s. 6d.

Orchard Notes for November.

By ALBERT H. BENSON, M.R.A.C.

The Southern Coast Districts.

November is somewhat of an off month for fruit, as the crop of strawberries is about over; pineapples, with the exception of a few off-season fruit, are not ready for marketing; and citrus fruits of all sorts, with the exception of those grown in the latest districts, are now over. Bananas should, however, be improving, particularly if the season is favourable.

The most important work of the month is the cultivation of the orchard, as, in order to retain moisture in the soil, it is essential that the soil be kept in a fine state of tilth. Where land is liable to wash, breaks should be left between the fine-worked land, or, even better, a good break of cowpea or other leguminous crop, valuable for producing nitrogen and humus, should be grown. All fruit pests should be attended to; cyaniding can be carried out when necessary, and is especially useful now in the case of the Red, Purple Mussel, Circular Black, and Glover Scales. Fruit fly should be systematically fought; all infested plums, peaches, guavas, or other fruits should be gathered and destroyed, so as to prevent the spread of the pest. Sucking bugs of all sorts should be gathered and destroyed, the egg-clusters, as well as the immature and mature insects, being destroyed. Hand-gathering is as good a plan as any. Fig beetles should be destroyed by spraying with Kedzie's mixture; and the egg-clusters should be destroyed whenever found.

Bananas and pineapples can be planted during the month, taking care, in the case of pineapples, not to set out suckers that will immediately throw out a fruit, but those that will become firmly established before they fruit. Examine the vineyard carefully, and keep it well worked. Look out for Oidium and Black Spot, and treat for same as recommended in the Orchard Notes of the two previous months.

Early ripening grapes will be reaching maturity towards the end of the month; but few, if any, will be ripe. In any case do not market too immature fruit; rather wait a few days longer, till it is fit to eat.

TROPICAL COAST DISTRICTS.

The main crop of pineapples will ripen during the month; and if gathered at the right time—viz., when fully developed, but not turned colour—they will carry all right South, if carefully handled and well packed. Pawpaws and granadillas are still in season, and will meet with a good Southern demand; they must be packed in cases containing only a single layer of fruit, and should be sent in the cool chamber. I am certain that a good market can be got for these fruits in both Melbourne and Sydney, particularly at this time of year, when their winter fruits are off, and their summer fruits are not yet on.

Watch bananas carefully for fly. Keep the orchards well cultivated.

Only ship good mangoes South; far too much rubbish is sent to Brisbane. Good mangoes will pay to pack properly, but the common sorts, which predominate to an enormous extent, will barely pay freight, if there is a good crop. The canning of good types of fibreless mangoes of good flavour is well worth taking up commercially in the North, as a ready sale for the canned fruits can be obtained.

As in the Southern Coast districts, all fruit pests should be systematically fought, and the orchard should be kept in a good state of tilth, as, once the wet season starts, there is little chance of cleaning up weeds and rubbish of all kinds, or of cultivating and sweetening the soil.

SOUTHERN AND CENTRAL TABLELANDS.

The earlier kinds of summer fruits, such as cherries, will ripen during the month. See that, if fruit fly makes its appearance, it is systematically fought.

Look out for Codling Moth, and continue the sprayings with Kedzie's mixture.

Look out carefully for any San Jose Scale that may have escaped the winter spraying, as, if the trees are sprayed whilst the young are hatching out, the bulk of the insects are killed, and little damage is done either to the tree or fruit.

The sulphide of soda spray is one of the best to use now. Keep Woolly Aphis in check, should it make its appearance, using the resin washes; or, if it and San Jose Scale are both present, use the sulphide of soda spray.

Watch the vineyards carefully for Black Spot and Oidium. Keep the orchard and vineyard well cultivated, so as to retain all the moisture in the soil required for the growth of the tree and development of the fruit. In the warmer parts, irrigate when necessary, following the irrigation by deep and systematic cultivation.

See that grape vines have plenty of foliage to protect the ripening fruit from sun scald, but yet not so dense a foliage as to induce Oidium or Black Spot. Look out for Red Scale on citrus trees, and cyanide to check same. Look out for fruit fly in the early ripening fruits, and gather and destroy all that may be so affected.

Farm and Garden Notes for November.

FIELD.—Under ordinarily favourable conditions, harvesting the wheat and barley crops may now begin. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, kafir corn, teosinte, sorghum, &c. Plant sweet potatoes, sisal hemp, yams, peanuts, and ginger.

KITCHEN GARDEN.—Why do so few gardeners and farmers grow their own vegetables? This is a question frequently asked by visitors to the farming districts. The reason probably is, that vegetables require a good deal of care and attention, which means also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy; the Chinese gardeners supply the towns with all kinds of vegetables, except, perhaps, cauliflowers, during the whole of the summer. It is, therefore, clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March. If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow-dug ground. When sowing and planting during this month, give plenty of room between the rows and the plants; otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines; they will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radishes, pumpkins, cucumbers, marrows, rosellas, &c.; and transplant for succession in calm, cloudy weather.

FLOWER GARDEN.—Stake any dahlias which may be now above ground, and plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs which have done flowering, and store them in a dry place. Winter-flowering plants will have gone off almost; still, the garden should be in full bloom, and will well repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if they were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissi. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer chrysanthemum, calliopsis, and nemophila.

Agriculture.

WHEAT RUST.

Towards the end of September last a very instructive paper on "Wheat Rust, What it is, and How it Comes," by Mr. A. Martin, of Warwick, the wheat-growing centre of the Downs, was published in the "Warwick Examiner and Times." This paper is well worthy of study by all up-to-date farmers, and we therefore place it on record in this Journal for the benefit of present and future wheat-growers. It is too lengthy for the space available in a single issue of the Journal, and will, therefore, appear in this and the next month's publications:—

From the present outlook it would appear that the coming harvest will be a good one on the Downs. We have been fortunate this year in having well-distributed rainfalls since our wheat crops were sown, and other conditions, so far, have been favourable for first-class yields, but a few sultry, moist days at a certain period in the growth of the wheat crop may bring about a visitation of rust which will do more or less harm, and perhaps greatly reduce the yields on many of our farms.

When we consider the visitations of past years we are apt to be set thinking of what the consequences may be should the present year prove suitable to the propagation of rust, and the first thought which crosses our mind is: What remedies or preventives have we for minimising the attacks of the rust fungus and the consequent loss of grain?

Now, for a proper understanding of how the loss in yield arises from rust epidemics, and for an intelligent application or preventive measures, it is necessary that the nature of wheat rust and of the conditions favourable to its development should be generally known amongst wheat-growers. There are a few of our farmers who are well posted in the matter, but the great majority have only a crude knowledge of the subject. They know that rust appears, and none know better the damage it may do, but very few understand the nature of the disease, its life history, and the best means of prevention.

It is necessary that what has already been learnt by observation and investigation of rust in wheat should become more widely known in agricultural circles. Some farmers have actually been known to express the opinion that rust in wheat is similar to rust on iron, and although such a crude notion as this must not be taken as representing the knowledge on the subject amongst our farmers generally, it is yet certain that, as a rule, very little in detail is known by them concerning the results of recent investigations into the nature of this pest.

In order to acquaint our farmers with the nature of wheat rust and the best means of combating it, the following description and history of the fungus has been compiled, and these facts should be of more than passing interest to all wheat-growers, especially at the present time, when an appearance of the pest is being watched for by most observant farmers.

From the description which follows it will be gathered that the rust is a microscopic fungus, similar in its main characters to the ordinary green mould that grows on cheese and to the mildews which are commonly found in damp places on objects of every description. The rust fungus grows mainly in the tissues of the blade and the stem. It also attacks the ear, but does not, so far as at present known, directly attack the seed. By absorbing, however, the sap of the plant for its own use, it deprives the grain of its necessary nourishment, so that the seed matures in a pinched and shrivelled

condition. It is held by many authorities that when the parasite attacks the ear the wheat grain becomes more shrivelled than when only the stem and the leaves are attacked.

Like all other fungi, wheat rust is propagated by spores or germs, which are produced in countless numbers, and some of which remain in the straw and the ear, some cling after threshing as dust to the seed, and some, being carried about by the breeze, lodge in the soil or on other plants. There are two kinds of these spores—namely, the red ones, which germinate quickly and are the means through which the pest having once broken out is able to spread with its characteristic rapidity through an entire crop; and the black ones, known as resting spores, which do not appear until near harvest time, and remain a whole season before they bud forth in new life. It is by means of these latter that the fungus under ordinary conditions is continued from season to season.

The conditions favourable for the germination of these spores are the conditions favourable for the growth of almost all such fungus pests—namely, a warm, damp, still atmosphere. Any circumstances—such as an outbreak of hot weather immediately succeeding heavy rain, such as damp, ill-drained swampy land, and so on—which lead to the establishment of these conditions are favourable to an outbreak of rust. The spores, as has already been observed, are carried about on the breeze, so that they become lodged on various plants. They do not, however, flourish on all plants; but on barley, oats, wild oats, canary grass, and many of the ordinary grasses they are known to thrive.

Hence, it will be understood, that in devising preventive measures against rust, it is not sufficient to take into account only the circumstances which attend its attack on wheat. The fact that the circumstances leading up to an outbreak of rust are various will explain many of the apparent discrepancies in the observations of practical wheat-growers, and will render easily explicable the conflicting evidence that is forthcoming. For it will be readily understood that in some cases weather conditions favourable to the rapid development of rust may not appear until late in the season, in which case early sown crops will, to a great extent, escape. This in most wheat-growing districts is the general experience.

But, on the other hand, the favourable weather conditions may perchance fall very early in the season, and be succeeded by very unfavourable weather conditions. In such a case the early sown crops would suffer most. Or it may be that, in some seasons, while the conditions are favourable to the growth of rust, they are also favourable to the development of rust-resisting power in the wheat, or *vice versâ*, and also it will be understood that since the circumstances leading up to the conditions favouring the development of rust are various, so the measures taken to prevent an outbreak must be various. No one measure, no one specific, should be expected to be universally successful in this application.

Past experience, however, has already brought to light and fully tested some important measures which may with advantage be immediately adopted. Experience has also shown the necessity of obtaining definite and reliable facts concerning the utility of various other measures, not yet fully tried, but which circumstances seem to indicate as being of a more or less promising character. It will also be apparent from the general tenor of the evidence that the devising and practical application of methods for coping with the rust pest will be a work of time and the result of continuous earnest effort. There will be no royal road to success, but, like all great improvements, it will be the outcome of gradual progress, and of the labours of many workers.

Before discussing the known methods of combating rust we will give a short description of the nature of the pest. If a piece of rusted wheat be closely examined, there will be seen scattered over the blade, stem, and probably the ear, many small red spots—otherwise called pustules—which,

in ordinary cases, are from one-eighth to one-twenty-fifth of an inch in length, and much smaller in width. The size and shape, however, is not constant, for, as frequently happens in eruptive diseases, these pustules in very bad cases run into each other, forming large irregular blotches.

The actual shape, size, and general appearance of these pustules vary according to the severity of the disease, and according to the toughness and general character of the tissues of the wheat plant, the toughness and general character varying, of course, according to the variety and the age of the plant, and according to the part of the plant attacked.

If one of these pustules be cut across with a razor, and if from the section thus made a thin slice be cut, and examined under a microscope capable of magnifying it 200 times, it will be observed that the skin of the wheat plant has been bulged out and burst asunder by a growing mass underneath it. On looking more closely at this growing mass it will be seen to consist of a number of red, egg-shaped bodies supported on transparent, almost colourless stalks or pedicels; the pedicels in their turn arising out of an interlaced mass of fine ramifying fibres.

These egg-shaped bodies consist of a quantity of yellow or orange-coloured gelatinous living substance contained within a bladder-shaped skin or membrane. The bodies, when mature, become loose and fall off in clouds of the red microscopic dust which is so characteristic of a rust-affected wheat-field in certain stages. If some of this microscopic dust be put in a warm, moist place, as, for instance, on a damp cloth, or on the wet glass slide of a microscope, or on the moist surface of a leaf, the membrane of the bodies may, after a little time, be observed to be burst open at a weak spot, and the living contents of the body will begin to pass out through the openings thus formed.

The living contents thus liberated will flow slowly along in a minute stream, following, like a river in its bed, the natural depressions of the surface along which it moves. This outflow of the living contents does not, as a rule, take place equally on both sides; on the one side it proceeds for only a very short space, and then stops, while on the other side it progresses in a long winding stream, which continues to increase in length so long as any of the living jelly remains within the bladder-shaped body. From 12 to 24 hours are required for the bladder to thus become completely empty of its contents.

STACK ENSILAGE.

We have lately had several inquiries about stack-ensilage. This method of making silage is, of course, preferable to making no provision whatever for a supply of fodder in a dry time. But pit ensilage is still better, and a strong, air-tight, round, reinforced concrete silo better than any.

Where, however, a man's means do not permit of his going to the expense of making silos in or above ground, then the stack silo may be resorted to, and, if the stack is properly made, there will not be much loss, and even what there is will be eaten by stock when little else is procurable. The stack system is undoubtedly the cheapest and simplest of any.

A stack may be erected in the paddock where the crop is grown, so that a great saving in cartage is secured. It is also easier to make sweet silage in stack form than by the use of rigid silos, and a stack has unlimited capacity—that is, it can be made of any size suitable to the quantity of fodder grown. There is also less waste in the larger stacks, owing to the fact that the larger the stack the less the exposed surface in proportion to the mass.

There are two kinds of silage—sweet and sour. It is the former that is the most suitable to make under the stack system. It is in controlling the result, or, in other words, the production of sweet or sour silage at will,

that the whole art of ensilage exists. This result depends upon the temperature which the mass has been allowed to reach and the amount of pressure applied.

If after carting the green material, heavy pressure is at once applied, the air is excluded and the temperature of the mass is consequently kept at a low level. When by this means the temperature is prevented from rising above 120 deg. Fahr. sour silage results. On the other hand, for the production of sweet silage the mass must not be weighted to any great extent before the temperature has reached from 130 deg. Fahr. to 150 deg. Fahr. Care must be taken not to allow the temperature to rise above 160 deg. Fahr. or the stack will become overheated and burst. The intelligent use of the thermometer is the chief factor in successful ensilage-making, and to the neglect of these few simple details the many failures may be attributed. An ordinary floating dairy thermometer is the most convenient type to use, an iron pipe of slightly larger diameter being built into the middle of the stack in a vertical position. The thermometer may then at any time be lowered by a string and the temperature taken at any required depth.

The best advice as to building an ensilage stack was given as follows some time ago by Mr. Conlon, Dairy Expert, Tasmania:—

In building the stack—which for the sake of avoiding cartage may be built on a level spot in the open field—on the spot chosen, a thick layer of straw should be laid down as foundation, the size and shape being found by estimating that for every 3 tons of hay the crop would have produced, about 10 tons of silage may be reckoned on. Having arrived at an approximate estimate of the weight, the base measurement should be somewhat as follows:—For 15 tons, 9 ft. by 9 ft.; 20 tons, 10 ft. by 10 ft.; 50 tons, 13 ft. by 13 ft.; 100 tons, 16 ft. by 16 ft. Only as much of the crop as can be carted and stacked in one day should be cut; a day or two should then elapse before adding more material. Then allow the temperature to rise and also the mass to subside, which facilitates the work of stacking. In an ordinary large stack the sides are built projecting outwards; this must be carefully avoided in building silage stacks. It is far better to have the sides and ends inclining inwards; there is then less tendency of the stack to lean over, which frequently happens, owing to the fermentation causing unequal settling of the mass. Should this occur, props must be set—at a wide angle—to the leaning side, when, on further subsidence taking place, the pressure brought to bear will bring the stack back to the perpendicular. From the first load to the completion of the stack the greatest attention should be paid to the outside edges. This is a very important point. The outsides should always be kept higher than the centre when stacking, and should be made much more compact by being well trodden down, the centre being left comparatively loose. When finished, the top should be levelled and covered with a layer of straw, pressure being then applied by piling the handiest material procurable on the top, so that a dead weight of about 1 cwt. per square foot is secured.

GREEN MANURING.

The object of growing certain green crops and subsequently ploughing them under is to supply the want of nitrogen to soils which have been gradually failing to yield satisfactory crops, owing to the omission, year after year, to renew the supply of plant food which has been taken from it. By green manuring, a large quantity of needful organic matter is returned to the soil. Without humus, the soil becomes lifeless, and cannot exert any great influence on plant life; and, furthermore, it will not assist the action of fertilisers. But the latter will not be entirely successful unless there is a proper supply of organic and mineral manures such as potash, lime, and phosphoric acid present in the soils on which crops are to be grown. There

are certain plants which have the property of collecting nitrogen. These are cowpeas, lupines, velvet beans, in fact any plant of the pea or bean family which grows quickly, and should be ploughed in before attaining maturity. These supply a very large quantity of that necessary element—nitrogen. They obtain it from the air, and then give it up to the soil. The amount they collect, according to the crop sown, varies from 53 to 134 lb. per acre, and if such a leguminous crop is ploughed in green the amount of nitrogen resulting will be equivalent to a good dressing of nitrogenous manure, such as nitrate of soda, sulphate of ammonia, or farm-yard manure. Besides the nitrogen, there is a large quantity of carbonic acid which dissolves other plant food and makes it available for the succeeding crop. The cowpea is the best nitrogen-producing plant for use in this State, although white lupines are preferred in European countries, because they root deeply, grow quickly, and bear a quantity of leaves. The velvet bean also produces an enormous mass of leaves. The cowpea thrives in almost any soil, though a friable sandy loam is to be preferred. The land must be ploughed deep and well pulverised. It can be planted so soon as frosts are over, as it is very sensitive to cold, the slightest cold killing it. The rows should be 3 ft. apart, and the plants 1 ft. apart in the rows. When planted in rows one bean is enough for a plant, in which case about 8 lb. will sow an acre. With favourable weather the plants appear in from three to five days. In a couple of months the plant will take care of itself, the whole field appearing as an uninterrupted mass of foliage. If grown for green manuring, now is the time—that is, when the flowers begin to appear—to roll it down and plough it under, the plough being provided with a Yankee mouldboard, a sharp revolving coulter, and a heavy chain dragging in front of the mouldboard. If time permits, it is not a bad plan to let it rot on the soil. It can also be mown down and made into excellent ensilage, especially if mixed with corn and sorghum, or can be turned into hay. The cowpea can also be eaten down by sheep, cattle, and horses, which are all very fond of it. And, lastly, it can be grown for its beans as a money crop, and by no means a bad one either.

Summarised, a crop of cowpea will provide, at choice—1, with green pasture for stock; 2, with ensilage; 3, with hay; 4, with a good supply of beans; 5, it has kept your land perfectly free from weeds; 6, it has enriched it with an abundant supply of the precious nitrogen; so abundant, in fact, that visitors to the farm, seeing the extraordinary difference between the plants—maize or wheat—grown on the cowpea plot, would ask if there had not been a sheepyard there before; 7, it has not appreciably impoverished the soil of its mineral matters, as the cowpea has powerful roots, loosening the soil in every direction, and bringing its mineral constituents within the reach of the roots of the following crops; 8, it leaves the land in a perfectly pulverised state; 9, it does not occupy the ground long. When sown in Spring, the crop is gathered in December or January, and can be followed by corn, sorghum, potatoes, &c. If sown in November, after harvest, it has yet time to mature before next sowing season arrives.

There is one danger to guard against in green manuring. If continued dry weather comes on immediately after ploughing in a heavy green crop on a light soil, more harm than good is done, because the buried plants will not rot. The soil being rendered more open by them, the moisture will quickly evaporate, and only by careful rolling, harrowing, and cultivating of the surface will it be possible to get a good succeeding crop.

Green manure sometimes acts very slowly, and this is worth noting. The inorganic matters and the nitrogen in the buried plants are not all consumed by the living crop, because the dead ones have not all been completely rotted, so that something will remain for the benefit of a second crop. If green manuring is done at all, it must be done thoroughly, which means that the heaviest possible crop of cowpeas or other nitrogen-producing crop should be grown by the help of fertilisers, and then such a mass be ploughed in as will equal, to a great extent, a fair manuring with farm-yard manure.

DETERIORATION OF THE POTATO.—SPRAYING.

For some years the potato, not only in Queensland, but in many other parts of the world, has, in some districts, been deteriorating. We can remember when the potato in Queensland never suffered from any disease, except, occasionally, worms in the summer crop, produced by the attacks of the potato moth (*Lita solanella*).

To-day, unfortunately, the potato is subject to many diseases akin to those which have caused such devastation in Europe. The degeneration of potatoes in the old country, and also in this State, is, according to a "Kew Bulletin," due to the methods of selection, and the lines followed in attempts to improve various varieties of potatoes. In short, "degeneration appears to be due mainly to the vegetative method of reproduction commonly followed." Such methods have largely attained their object; this is, increased yield, improved flavour, and smooth and even surface, with shallow "eyes;" but they have also led to other results. The vegetative method of reproduction, it is aserted, has favoured a comparative absence of diastase, the ferment responsible for the conversion of the starch into the liquid sugar necessary to enable the potato to sprout. Absence of sprouting is, of course, due to a lack of the necessary food material which the diastase should prepare. Indeed, in the case of tubers that had failed to sprout, a total absence of diastase was proved. It is remarked that one correspondent stated that of 70 tons of high-grade potatoes specially intended for seed, only 5 tons showed signs of sprouting, the result being a serious loss. In Germany the loss due to this cause has varied from 5 per cent. to total loss, the average being 50 to 60 per cent. It has been shown in experiments conducted at Kew over three years that sterility, or failure to sprout, is accompanied by the comparative absence of diastase, as already stated, and by more or less arrest of the development of the vascular system of the tuber. The absence of diastase results in non-formation of the necessary sugar from the starch, while the non-development of fibro-vascular bundles means that if food material is present, it cannot be conducted to the growing points or eyes. If the food is but scanty, owing to the comparative absence of diastase, sprouts may begin to grow, but will perish at an early age. Abandonment of all forcing or selective tactics on the part of the grower enables the plants to regain their power of producing diastase, but, in such a case, the good points won by the grower—increased crop, improved quality, &c.—appear to be largely lost. It was found also that a liberal dressing of superphosphate increased the amount of diastase much more than farm-yard manure, while light favours the production of diastase more than does darkness. More diastase also is produced in a high than in a low temperature.

Spraying.

To-day farmers will do well to earnestly take up the matter of spraying, according to the methods demonstrated in different parts of the State, last September, by Mr. A. H. Benson. The undoubted beneficial effects of spraying potatoes were conclusively shown as far back as 1901, in County Meath, Ireland. There, several acres were carefully sprayed with the ordinary copper and lime solution. The potatoes were dressed three times. Another portion of the field was treated in exactly the same manner, insofar as planting and cultivation were concerned, but the plants were not sprayed. Now, note the results as here given:—

"On that portion of the crop which had been twice sprayed the foliage was so dense and green that it was almost impossible to distinguish one drill from another, while on the immediately adjoining unsprayed plots all that was to be seen was a forest of bare stalks, all of them absolutely leafless, and many quite withered out of existence. A more pronounced contrast it would be difficult to conceive. At a little distance one portion of the field presented the appearance of a vigorous crop of potatoes at midsummer, while the other

showed hardly a trace of vegetation, because even the few stalks that remained had been withered into masses of bleached woody fibre. Here and there a few spots of disease could be discerned on some of the sprayed plants, but the extent of leaf surface so affected was so small as not to be recognisable at any distance."

With regard to the respective yields of tubers on the sprayed and unsprayed portions, the following were the returns:—

Sprayed Section.

Large (marketable) tubers	15·6 tons.
Small "	3·9 "
Diseased (a trace)	2 tubers in a perch.

Unsprayed Section.

Large (marketable) tubers	6·3 tons.
Small "	5·9 "
Diseased "	2·4 "

Another instance of the benefit of spraying comes to us from Fifeshire, Scotland, on which the "Scottish Farmer" says:—At six stations various plots of potatoes were planted, and the same manures were used for all, consisting of 15 tons per acre of farm-yard manure, applied in the drills, and the following artificials, applied partly in the drills and partly at the hilling-up period: 4 cwt. superphosphate, 1 cwt. sulphate of ammonia, and 1 cwt. sulphate of potash. The average yields of the several varieties, sprayed and unsprayed respectively, were as below:—

Variety.	Unsprayed.				Sprayed.			
Early.	T.	c.	q.	lb.	T.	c.	q.	lb.
British Queen	12	0	2	23	11	19	3	18
General Kitchener	11	18	0	7	11	1	2	25
Sutton's Abundance ...	8	18	0	20	8	15	0	24
Challenge	7	12	0	23	7	19	3	24
Late.								
British Lion	10	15	2	24	11	6	0	21
Up-to-Date	10	2	1	21	10	13	1	19
Scottish Triumph	9	18	0	2	10	13	1	14
General Roberts	8	10	0	13	9	1	1	20
Langworthy	7	18	3	3	8	5	1	11
Maincrop	6	16	3	10	7	8	0	20

The conclusions derived from the trial are as follow:—

The results of spraying in yields of sound tubers dressed over a riddle of 1⅝-in. mesh are given as averages of ten varieties and ten acres at the several stations:—

Centre.	Unsprayed.				Sprayed.				Increase.				Decrease.			
	T.	c.	q.	lb.	T.	c.	q.	lb.	T.	c.	q.	lb.	T.	c.	q.	lb.
Uthrogle ...	57	17	0	6	65	7	3	12	7	10	3	6	...			
Balcomie ...	91	3	0	4	97	19	0	12	6	16	0	4	...			
Cairnie ...	74	10	0	0	78	4	2	16	3	14	2	16	...			
Montrave ...	50	13	1	16	58	13	1	16	8	0	0	0	...			
Balbeggie ...	64	13	3	20	61	13	0	4	...				3	0	3	16
Lecker'tone...	64	15	2	24	60	1	3	20	...				4	1	3	4

Hence it is concluded that spraying is beneficial if carried out early enough in the season. Late spraying retards the growth, and does little or no good. On the other hand, it appears that, if spraying is carried out at the proper time and under suitable conditions of weather, the bulk of the crop is increased, while there is less disease and a larger proportion of marketable potatoes.

YIELDS OF ROOT CROPS AND CABBAGES GROWN AT THE QUEENSLAND AGRICULTURAL COLLEGE.

In submitting the following particulars, the Principal, Mr. John Mahon, points out, as he has frequently done in years gone by, the value of the mangold wurtzel to dairymen, and the breeders of live stock generally. The mangold is the king of root crops—first, because of its heavy yields; secondly, because of its keeping qualities; and, thirdly, because of its feeding value. Thirty to forty tons per acre, without manure, is a fair yield. The mangold will keep in the ground for two years. Its feeding value is greater than that of any other root crop. Cattle, horses, pigs, and sheep eat this food very ravenously, and thrive well on it. Of all known varieties, the Long Red is the best, being the heaviest yielder, and possessing the best keeping qualities. The following are the particulars regarding the growth and yield per acre:—

Date Planted.	Variety.	Yield per Acre.			When Harvesting Commenced.
1909.		Tons	Cwt.	Qr.	1909.
	MANGOLDS.				
13 March	Long Red	56	16	3	1 August
13 ,, ...	Red Globe	40	17	2	1 ,,
13 ,, ...	Yellow ,, ...	33	15	0	1 ,,
	SWEDES.				
13 ,, ...	Mammoth Purple Top	30	15	1	Last week July
13 ,, ...	Aberdeen ,, ,, ...	26	10	2	First ,, ,,
13 ,, ...	,, Green ,, ...	16	16	0	,, ,, ,,
13 ,, ...	Pomeranian White Globe ...	29	19	0	,, ,, ,,
13 ,, ...	Lincolnshire Red Top	27	15	0	,, ,, ,,
	CARROTS.				
13 ,, ...	White Belgian	10	14	2	September
	CABBAGE.				
28 April	Drumhead	32	8	0	,,
	BEET.				
13 March	Improved Sugar	32	14	1	,,
	KOHL RABI.				
13 ,, ...	Large Purple	24	13	2	August
13 ,, ...	,, Green	16	5	0	,,

The swede is a good food for stock, and makes rapid growth. The great objection to this crop is that it will keep for but a short period, either in the ground or in a pit. I have also found the swede to give taints to milk.

The White Belgian Carrot is an excellent food for stock, but it is found to be rather difficult to grow, and, unless supplied with plenty of moisture in its early growth, will produce poor results.

Kohl-rabi: This crop is an excellent food for pigs, can be grown on rich or poor soils, will keep for a considerable time in the ground or in a pit. It does not require as much moisture as other root crops.

There being no sale for cabbages at the time when they matured, the crop was chaffed and fed to milch cows.

EXPERIMENTS WITH COTTON VARIETIES, 1908-09 CROP.

Field 9.—Upland cotton. 2 acres. Planted 1st October. In rows 4 ft. apart, and thinned out to a distance of 18 in. between the plants. Although the soil is somewhat heavy for cotton-growing, still a very satisfactory yield was obtained. Three pickings were secured—viz., 8th March, 14th May, and 1st June. The total yield harvested from the 2 acres is 18 cwt. After a few frosts another picking of at least 1 cwt. per acre will be obtained.

The following varieties were experimented with in small areas of about 6 poles each. Planting and harvesting were carried out at the same time as the 2 acres of Upland. The yield given is as per acre:—

	Cwt.	qr.	lb.
Towers Triumph	13	2	0
Jeonavich (Sea Island type)	12	0	12
King's Early Improved	11	1	0
Culpepper	11	0	0
Texas King	10	2	0
Towers Special	10	1	0
Jones's Reimproved	10	0	0
Peterkin	9	3	0

ENGLISH POTATOES.

During October, 1908, some 36 varieties of English potatoes were introduced from Tasmania. On arrival, they were planted in a portion of the Gatton paddock that had recently been brought under cultivation. Considering that the planting took place about two months out of season, high returns were not anticipated, the hot weather inducing a heavy crop of haulms, which was against the full maturing of the tubers. Harvesting took place on 8th December. (Results given in tabulated form below.) The resulting crop was planted on 4th February, 1909. There being only a small quantity of each variety, most of the potatoes were made use of, although many of them were really too small for seed purposes. Owing to this, and to a dry period following shortly after the planting, a lower yield was secured than would have been the case had we been able to select the seed from well-matured varieties. The results obtained from the two plantings were as follow:—

Variety.	1908 Crop.			1909 Crop.		
	Tons	Cwt.	Qr.	Tons	Cwt.	Qr.
Robin Adair	2	11	0	2	18	2
Up to Date	5	11	0	3	5	0
American Rose	5	0	0	3	5	0
Burbank...	4	1	3	3	8	3
Rough Red	3	16	0	2	19	2
Warrior...	5	11	2	4	4	3
Royalty	4	3	1	3	15	2
Pink Eye	4	12	2	2	0	2
20th Century	1	15	2	3	15	2
Early Rose	4	10	0	2	14	2
Derwents	2	3	2	2	10	2
Ninetyfold	5	10	3	5	6	2
Champion	5	3	0	3	9	1
Californian	5	10	4	3	15	0
Queen of the Earth	3	16	0	2	12	3
Sutton's Seedling	1	4	0	1	17	1
Advance	5	8	0	4	7	2
Northern Star	4	7	0	3	8	0
Early Thoroughbred	6	13	3	4	1	0
Jeanie Deans	3	1	2	2	11	3
Scotch Grey	2	8	2	2	7	3
Werona Red	4	1	3	3	0	2
Centennial Red	4	2	3	3	2	0
Red Skin Kidney	4	1	1	2	8	3
Challenge	5	0	0	2	10	2
Maori Chief	4	12	2	3	2	0
Sir John Llewellyn	4	1	3	3	17	0
Duke of Rothesay	4	13	3	2	17	3
Duchess of Buccleuch	4	15	1	2	13	1
Royal Purple	5	5	2	3	1	0
Scotch Red	4	3	1	3	9	2
Scotch Triumph	4	3	1	3	1	1
White Californian	3	4	3	3	2	3
Commonwealth	5	3	0	4	11	0
Plunkett's	2	15	2	1	7	0
Dunion	2	8	1	2	11	3

LUCERNE SEED FROM CUTTINGS.

To some of our ("Garden and Field") readers who are raising lucerne seed it will be of importance to note the following interesting particulars of the best and surest method of obtaining pure seed true to character and entirely free from dodder, which is always a difficult matter. A writer in an exchange remarks that:—"When plants can be propagated by cuttings, the ideal, once achieved, is easily maintained; for plants so propagated come true, or, in other words, maintain the characters of the parent plant with little variation. Far otherwise, however, with plants propagated by seed, for after selection has achieved the ideal, it has still the task of fixing it so that it will come true to seed."—Osterhout, Plant Experiments, page 433. When, in 1907, a Victorian grower demonstrated that lucerne could be propagated by cuttings, he had not read the above, writes "R.D." in the "Australasian." His experience, however, has verified the truth of the assertion. He is satisfied that a lucerne plant cultivated by him since March, 1903, is an ideal one, and he is extremely gratified that he has been able to propagate it by cuttings. The plants so got in March, 1907, have during the past season produced one-twelfth more fodder than plants resulting from seed sown at the same time. From other plants propagated by cuttings in March, 1908, eight crops have been taken during the past season, the eighth—in June—being at the rate of over a ton to the acre. From plants got from seed at the same time only six crops were obtained from the plants propagated by cuttings. The greatest difference, however, occurred between the plants propagated in the Spring of 1908, those got by cuttings having given more than eight times the weight of fodder which was produced by the seedlings. One of the plants got by a cutting in August, 1908, was allowed to go to seed, some forty spikelets having been gathered in April, 1909. From one of the pods seven seeds were sown on 16th April, all having produced plants. The difference between the plants propagated in 1908 was very marked in June, 1909. Those got by seed had only made 6 in. growth in the interval 26th March to 9th June, and were not considered worth cutting; while the plants got by cuttings had a growth of 18 in. Whether it would be profitable to propagate lucerne by cuttings for fodder is a problem which most of those who should know, answer in the negative. There, however, is a general consensus of opinion that it appears as if a good strain of seed might be obtained by this means.

VINE CANES AS FODDER.

Few vignerons are aware of the value of vine-prunings as winter food for both cattle and horses. Vine canes, containing, as they do, stores of reserve material, such as starch and proteids, to start the growth of the plant the following Spring, constitute a fair fodder for stock. The chief difficulty in connection with their use is the amount of preparation necessary in the way of chaffing and crushing. When hay is cheap, such militates against their use, but in seasons of scarcity they become valuable, especially for use in conjunction with other fodder. In France they are largely used, and special machines for treating them are there obtainable. The Department of Agriculture and Stock wrote to the Agent-General's Office early in the year asking that particulars be obtained of the prices, &c., of these machines, and the Department has now been supplied with a catalogue issued by J. Garnier et Cie, of Redon (Ille-et-Vilaine), France, of machines for shredding grape-vine prunings. This catalogue, which is in French, may be inspected by anyone interested, at the office of the Department, and it may be stated that the machines range in price from about £8 to £15 10s., delivered at the railway station, Redon. The latter priced machine is worked exclusively by motor, has a speed of 150 revolutions per minute, and requires from 5 to 6 h.p. to drive it.

[Reference was made to shredding grape vines in the September number of the Journal.]

VINE-SHREDDER.

A memorandum from the Acting Executive Engineer, London, has been received by the Under Secretary, Department of Agriculture and Stock, from Mr. James Tearce, of the Agent-General's Department, London, on the subject of machinery for shredding vine-cuttings for fodder, to the following effect:—

"With further reference to my report of the 3rd August, I now send the following information, which I have received on the best authority, concerning the practical utility of J. Garnier and Co.'s machines:—

"They are used on a large scale in the South of France, especially around Arles, where there are a great many small vineyards. To these small vineyards are generally attached farms, and, there being no fodder in this part of the country, owing to the rocky soil suitable for growing vines, they make use of the vine-cuttings both for fodder and litter for the farm animals.

"I am told the machine gives very good results for this purpose. So far as my information goes, these machines are only used on comparatively small farms, where, as I have said, they give very good results, but I am unable to obtain information of their practical utility on a very large scale."

ENSILAGE MAKING.

The best ensilage, according to a Victorian authority, is made from plants with a solid stem, such as maize, sorghum, or amber cane, while with these crops there is the further great advantage that the whole of the stem, if the material is chaffed, becomes so soft and succulent that none is wasted by the animals. Considering also the total yield per acre, there is no question that where a crop is specially grown for silo, one of these should be chosen.

The hollow stem of cereals contains air, and this increases the loss by fermentation, even when chaffed; but, in spite of this defect, there is no better way of utilising a crop of rye or barley grown for fodder, which has become over-ripe to be relished by the cows. If other methods of securing green fodder are available, oats, wheat, and the mixed grasses and clovers are better made into hay. A mixture of peas, beans, tares, or clovers, with maize or cereals, greatly increases the food value of the silage, and, according to Canadian experiments, 1 acre of sunflowers with 2 acres of tick beans and 4 acres of maize makes a very satisfactory balanced ration for the dairy cow.

Ensilage should contain 75 to 80 per cent. of water—that is, most crops be siloed when the flowers are all out and the grain well formed. An exception occurs in clover, trefoil, and lucerne, which should be cut when in full bloom and allowed to wilt one day before filling into the silo. Generally speaking, a crop is ready for the silo a little earlier than it is for hay. Maturity is very important in the case of maize and similar crops which mature rapidly after the cobs are formed. Immature maize contains little nutriment.

LUCERNE AT WARRA.

Warra is a town and district of the plains, situated 180 miles west of Brisbane. The excellence of the soil, the fairly sufficient rainfall, and its situation on the Western Railway line, have resulted in settling a considerable farming population on these fertile lands. Amongst those farming the largest areas in the district is Mr. R. Clifton, who, in addition to crop raising, breeds a considerable number of sheep, cattle, and horses. He has about 400 acres under lucerne alone on his fine farm "Gesslands." Last month 125 acres of lucerne were mown for a first crop, and an average sample of the crop was brought to this office. The lucerne, which was just in flower, was 4 ft. in height, much of it 4 ft. 10 in. Such a splendid crop should give at least 1½ tons of fodder per acre. There was no abnormal rain during the whole of the growing season, which is proof that the soil is eminently suited to this class of fodder.

The Man who Works with his Hands.

In placing before our readers the article by ex-President Roosevelt under the above heading, we do so, not on account of its application to the people of the United States, but mainly owing to its peculiar significance to the people of Australasia, and of our own State in particular. As is said by "The Philippine Agricultural Review," which is publishing a series of the ex-President's articles: "Life in the country in these islands is the foundation of all the national aspirations and of the future greatness of the Filipino people. It is the country life in the Philippines more than anything else that needs to be awakened and quickened." Substituting Queensland for the Philippines, nothing can be more aptly put than the above. "The country, the farmer, and the rural population are the resources and the fundamental producers of wealth—the foundation of national existence—and through them only can national existence be made possible."

Ex-President Roosevelt points out these great needs of country life, namely:—

I. *Effective co-operation among farmers to put them on a level with the organised interests with which they do business.*

II. *A new kind of schools in the country which shall teach the children as much outdoors as indoors, and perhaps more, so that they will prepare for country life, and not, as at present, mainly for life in a town.*

III. *Better means of communication, including good roads and a parcels post.*

IV. *Better sanitation, inasmuch as many easily preventable diseases hold millions of country people in the slavery of continuous ill-health.*

Our civilisation, he says, in conclusion, rests at bottom on the wholesomeness, the attractiveness, and the completeness, as well as the prosperity of life in the country. The men and women on the farms stand for what is fundamentally best and most needed in our American life, for which we may also read "Our Queensland Life."

THE MAN WHO WORKS WITH HIS HANDS.*

* Circular No. 24, United States Department of Agriculture.

By THEODORE ROOSEVELT.

Our Educational System and What it Lacks.

As a people there is nothing in which we take a juster pride than our educational system. It is our boast that every boy or girl has the chance to get a school training; and we feel it is a prime national duty to furnish this training free, because only thereby can we secure the proper type of citizenship in the average American. Our public schools and our colleges have done their work well, and there is no class of our citizens deserving of heartier praise than the men and women who teach in them.

Nevertheless, for at least a generation we have been waking to the knowledge that there must be additional education beyond that provided in the public school as it is managed to-day. *Our school system has hitherto been well-nigh wholly lacking on the side of industrial training, of the training which fits a man for the shop and the farm. This is a most serious*

lack, for no one can look at the peoples of mankind as they stand at present without realising that industrial training is one of the most potent factors in national development. We of the United States must develop a system under which each individual citizen shall be trained so as to be *effective individually as an economic unit,* and fit to be organised with his fellows so that he and they can work in efficient fashion together. This question is vital to our future progress, and public attention should be focused upon it. Surely it is eminently in accord with the principles of our democratic life that we should furnish the highest average industrial training for the ordinary skilled workman. *But it is a curious thing that in industrial training we have tended to devote our energies to producing high-grade men at the top rather than in the ranks.* Our engineering schools, for instance, compare favourably with the best in Europe, whereas *we have done almost nothing to equip the private soldiers of the industrial army*—the mechanic, the metal-worker, the carpenter. *Indeed, too often our schools train away from the shop and the forge; and this fact, together with the abandonment of the old apprentice system, has resulted in such an absence of facilities for providing trained journeymen that in many of our trades almost all the recruits among the workmen are foreigners.* Surely this means that there must be some systematic method provided for training young men in the trades, and that this must be co-ordinated with the public school system. No industrial school can turn out a finished journeyman; but it can furnish the material out of which a finished journeyman can be made, just as an engineering school furnishes the training which enables its graduates speedily to become engineers.

We hear a great deal of the need of protecting our workingmen from competition with pauper labour. I have very little fear of the competition of pauper labour. The nations with pauper labour are not the formidable industrial competitors of this country. *What the American workingman has to fear is the competition of the highly skilled workingman of the countries of greatest industrial efficiency.* By the tariff and our immigration laws we can always protect ourselves against the competition of pauper labour here at home; but when we contend for the markets of the world we can get no protection, and we shall then find that our most formidable competitors are the nations in which there is the most highly developed business ability, the most highly developed industrial skill; and these are the qualities which we must ourselves develop.

Dignity and Importance of Labour.

We have been fond as a nation of speaking of the dignity of labour, meaning thereby manual labour. Personally I don't think that we begin to understand what a high place manual labour should take; and it never can take this high place unless it offers scope for the best type of man. *We have tended to regard education as a matter of the head only, and the result is that a great many of our people, themselves the sons of men who worked with their hands, seem to think that they rise in the world if they get into a position where they do no hard manual work whatever; where their hands will grow soft, and their working clothes will be kept clean. Such a conception is both false and mischievous.* There are, of course, kinds of labour where the work must be purely mental, and there are other kinds of labour where, under existing conditions, very little demand indeed is made upon the mind, though I am glad to say that I think the proportion of men engaged in this kind of work is diminishing. But in any healthy community, in any community with the great solid qualities which alone make a really great nation, the bulk should do work which makes demands upon both the body and the mind. Progress can not permanently consist in the

abandonment of physical labour, but in the development of physical labour so that it shall represent more and more the work of the trained mind in the trained body. To provide such training, to encourage in every way the production of the men whom it alone can produce, is to show that as a nation we have a true conception of the dignity and importance of labour. *The calling of the skilled tiller of the soil, the calling of the skilled mechanic, should alike be recognised as professions, just as emphatically as the calling of lawyer, of doctor, of banker, merchant, or clerk. The printer, the electrical worker, the house painter, the foundry man, should be trained just as carefully as the stenographer or the drug clerk.* They should be trained alike in head and in hand. They should get over the idea that to earn twelve dollars a week and call it "salary" is better than to earn twenty-five dollars a week and call it "wages." The young man who has the courage and the ability to refuse to enter the crowded field of the so-called professions and to take to constructive industry is almost sure of an ample reward in earnings, in health, in opportunity to marry early, and to establish a home with reasonable freedom from worry. We need the training, the manual dexterity, and industrial intelligence which can be best given in a good agricultural, or building, or textile, or watchmaking, or engraving, or mechanical school. It should be one of our prime objects to put the mechanic, the wage-worker who works with his hands, and who ought to work in constantly larger degree with his head, on a higher plane of efficiency and reward, so as to increase his effectiveness in the economic world, and therefore the dignity, the remuneration, and the power of his position in the social world. *To train boys and girls in merely literary accomplishments to the total exclusion of industrial, manual, and technical training tends to unfit them for industrial work; and in real life most work is industrial.*

The problem of furnishing well-trained craftsmen, or rather journeymen fitted in the end to become such, is not simple—few problems are simple in the actual process of their solution—and much care and forethought and practical common sense will be needed, in order to work it out in a fairly satisfactory manner. It should appeal to all our citizens. I am glad that societies have already been formed to promote industrial education, and that their membership includes manufacturers and leaders of labour unions, educators and publicists, men of all conditions who are interested in education and in industry. It is such co-operation that offers most hope for a satisfactory solution of the question as to what is the best form of industrial school, as to the means by which it may be articulated with the public school system, and as to the way to secure for the boys trained therein the opportunity to acquire in the industries the practical skill which alone can make them finished journeymen.

The Farmer in Relation to the Welfare of the Whole Country.

There is but one person whose welfare is as vital to the welfare of the whole country as is that of the wage-worker who does manual labour, and that is the tiller of the soil—the farmer. If there is one lesson taught by history it is that *the permanent greatness of any State must ultimately depend more upon the character of its country population than upon anything else. No growth of cities, no growth of wealth, can make up for a loss in either the number or the character of the farming population.* In the United States more than in almost any other country we should realise this, and should prize our country population. When this nation began its independent existence it was as a nation of farmers. The towns were small and were for the most part mere seacoast trading and fishing ports. The chief industry of the country was agriculture, and the ordinary citizen

was in some way connected with it. In every great crisis of the past a peculiar dependence has had to be placed upon the farming population; and this dependence has hitherto been justified. But it can not be justified in the future if agriculture is permitted to sink in the scale as compared with other employments. We can not afford to lose that pre-eminently typical American, *the farmer who owns his own farm.*

Economic and Social Factors Affecting Rural Populations.

Yet it would be idle to deny that in the last half-century there has been in the eastern half of our country a falling off in the relative condition of the tillers of the soil, although signs are multiplying that the nation has waked up to the danger and is preparing to grapple effectively with it. East of the Mississippi and north of the Ohio and the Potomac there has been on the whole an actual shrinkage in the number of the farming population since the civil war. In the States of this section there has been a growth of population—in some an enormous growth—but the growth has taken place in the cities, and especially in the larger cities. This has been due to certain economic factors, such as the extension of railroads, the development of machinery, and the openings for industrial success afforded by the unprecedented growth of cities. The increased facility of communication has resulted in the withdrawal from rural communities of most of the small, widely distributed manufacturing and commercial operations of former times, and the substitution therefor of the centralised commercial and manufacturing industries of the cities.

The chief offset to the various tendencies which have told against the farm has hitherto come in the rise of the physical sciences and their application to agricultural practices or to the rendering of country conditions more easy and pleasant. But these countervailing forces are as yet in their infancy. As compared with a few decades ago, the social or community life of country people in the East compares less favourably than it formerly did with that of the dwellers in cities. Many country communities have lost their social coherence, their sense of community interest. In such communities the country church, for instance, has gone backward both as a social and a religious factor. Now, we can not too strongly insist upon the fact that it is quite as unfortunate to have any social as well as any economic falling off. It would be a calamity to have our farms occupied by a lower type of people than the hard-working, self-respecting, independent, and essentially manly men and womanly women who have hitherto constituted the most typically American, and on the whole the most valuable, element in our entire nation. Ambitious native-born young men and women who now tend away from the farm must be brought back to it, and therefore they must have social as well as economic opportunities. Every thing should be done to encourage the growth in the open farming country of such institutional and social movements as will meet the demand of the best type of farmers. *There should be libraries, assembly halls, social organisations of all kinds. The school building and the teacher in the school building should, throughout the country districts, be of the very highest type, able to fit the boys and girls not merely to live in but thoroughly to enjoy and to make the most of the country. The country church must be revived. All kinds of agencies, from rural free delivery to the bicycle and the telephone, should be utilised to the utmost; good roads should be favoured; everything should be done to make it easier for the farmer to lead the most active and effective intellectual, political, and economic life.*

There are regions of large extent where all this, or most of this, has already been realised; and while this is perhaps especially true of great

tracts of farming country west of the Mississippi, with some of which I have a fairly intimate personal knowledge, it is no less true of other great tracts of country east of the Mississippi. In these regions the church and the school flourish as never before; there is a more successful and more varied farming industry; the social advantages and opportunities are greater than ever before; life is fuller, happier, more useful; and though the work is more effective than ever, and in a way quite as hard, it is carried on so as to give more scope for well-used leisure. My plea is that we shall all try to make more nearly universal the conditions that now obtain in the most favoured localities.

Progress in Agricultural Science.

Nothing in the way of scientific work can ever take the place of business management on a farm. We ought all of us to teach ourselves as much as possible; but we can also all of us learn from others; and the farmer can best learn how to manage his farm even better than he now does by practice, under intelligent supervision, on his own soil in such a way as to increase his income. This is the kind of teaching which has been carried on in Texas, Louisiana, and Arkansas by Doctor Knapp, of the National Department of Agriculture. But much has been accomplished by the growth of what is broadly designated as agricultural science. This has been developed with remarkable rapidity during the last quarter of a century, and the benefit to agriculture has been great. As was inevitable, there was much error and much repetition of work in the early application of money to the needs of agricultural colleges and experiment stations alike by the nation and the several States. Much has been accomplished; but much more can be accomplished in the future. The prime need must always be for real research, resulting in scientific conclusions of proved soundness. Both the farmer and the legislature must beware of invariably demanding immediate returns from investments in research efforts. It is probably one of our faults as a nation that we are too impatient to wait a sufficient length of time to accomplish the best results; and in agriculture effective research often, although not always, involves slow and long-continued effort if the results are to be trustworthy. While applied science in agriculture as elsewhere must be judged largely from the standpoint of its actual return in dollars, yet the farmers no more than anyone else can afford to ignore the large results that can be enjoyed because of broader knowledge. The farmer must prepare for using the knowledge that can be obtained through agricultural colleges by insisting upon a constantly more practical curriculum in the schools in which his children are taught. He must not lose his independence, his initiative, his rugged self-sufficiency; and yet he must learn to work in the heartiest co-operation with his fellows.

(TO BE CONTINUED.)

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF SEPTEMBER, 1909.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Peewee ...	Holstein-Shorth'n	29 Aug., 1909	994	3·9	43·45	
Grace ...	Shorthorn ..	17 Aug. ,,	925	4·0	43·41	
Rhoda ...	Shorth'n-Ayrshire	4 Aug. ,,	921	3·7	37·91	
Linda ...	Ayrshire... ...	11 April ,,	816	4·1	37·42	
Lass ...	,, ...	15 June ,,	765	4·2	36·88	
Lubra	Grade Jersey ...	4 April ,,	627	4·9	34·59	
Lark ...	Ayrshire	14 Aug. ,,	864	3·6	34·56	
Mona ...	Grade Holstein ...	13 July, 1907	561	3·7	23·09	
Honeycombe	Shorthorn ...	11 April, 1909	713	4·0	31·86	
Remit ...	Holstein	4 Aug. ,,	746	3·6	29·84	
Beauty ...	Ayrshire	11 April ,,	698	3·8	29·55	
Reamie ...	,, ...	7 July ,,	712	3·7	29·31	
Lady Vixen	Shorthorn... ...	25 June ,,	673	3·9	29·28	
College Lass	Ayrshire	31 Jan. ,,	626	4·0	27·97	
Cuckoo ...	Jersey	24 July ,,	568	4·3	27·38	
Cocoa ...	,, ...	12 Sept. ,,	528	4·2	27·37	
Auntie ...	Ayrshire	23 Aug. ,,	579	4·2	27·23	
Winnie ...	Shorthorn... ...	2 June ,,	639	3·8	27·06	
Butter ...	,, ...	20 Feb. ,,	594	4·0	26·54	
Helen ...	Grade Guernsey...	8 Aug. ,,	617	3·8	26·12	First calf
Lady Ring...	Guernsey ...	26 Jan. ,,	433	5·2	25·98	
Chocolate ...	Shorthorn... ...	15 June ,,	588	3·9	25·88	
Ivy ...	Jersey	16 June ,,	556	4·1	25·40	
Glen ...	Shorthorn ...	29 Jan. ,,	580	3·9	24·67	
Nellie II. ...	,, ...	1 Mar. ,,	555	4·0	24·80	
Ruby ...	Grade Ayrshire ...	6 Aug. ,,	567	3·9	24·67	
Cheerful ...	Shorthorn ...	4 July ,,	581	3·7	24·59	
Rosepetal ...	,, ...	7 Mar. ,,	593	3·7	24·40	
Rosalie ...	Ayrshire ...	10 Feb. ,,	555	3·8	23·49	
Md. Melba...	Holstein	8 Sept. ,,	583	3·6	23·34	First calf
Blackbird ...	Grade Holstein ...	4 Feb. ,,	550	3·6	22·00	
Poppie ...	Grade Guernsey...	6 Jan. ,,	408	4·6	21·11	

Herd run on natural pasture, and fed once per day on 30 lb. of barley, cabbage, or lucerne.

DEVELOPING A DAIRY HERD.

"Southern Farmer" sends us the following notes on raising a good dairy herd:—

If we would produce good milkers we must have good stock to breed from as well as the proper barns and conveniences for caring for them. It matters not what dairy breed is selected, for they are all adapted to some particular purpose, some perhaps better than others, but from my observation the man who succeeds with one breed, in most cases, would succeed with another had he selected it for the particular branch of dairying he intended to follow.

The cow from which the young dairy heifer is to breed must be, in form and appearance, and also in actual service, a good milker, possessing in herself as many of the desirable qualities as can be found. The bull to which she is coupled should be descended from a good milk-producing family, and

the breeder should be assured of the fact by a pedigree, if possible (at all events by a knowledge of the ancestors for a number of generations, both male and female), as a bull can get from 50 to a 100 calves in a year, and a cow a single one, and as you may have a large number of cows, it is very important that he be certain in his qualities.

By following this plan you may in a few years build up a herd of very good cows from ordinary grades through the good qualities of the bulls, and by following up this plan for four or more generations, it will result in as good cows for all practical purposes as the pure breds, that are out of reach of most dairymen who depend upon the profits from their dairy products alone.

TYPICAL SHORTHORN COW.

The illustration, Plate XXX., gives an excellent idea of the shorthorn cow Lady Kelso, one of the Queensland Agricultural College herd. She was bred by James Kirk, Mullumbimby, New South Wales, and took first prize for two years and under 3 years old, and the Reserve Champion at the Brisbane Show in 1905.

Sire.—Mr. G. O'Connor's champion bull Kelso.

Dam.—Rosey (shorthorn cow), owned by James Kirk.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1908.				1909.								
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
North.													
Bowen	0·96	2·47	0·42	0·42	15·48	4·52	1·06	1·15	2·32	1·98	1·23	0·13	0·21
Cairns	0·74	3·07	1·60	1·41	32·05	5·25	21·03	14·19	1·06	2·48	0·65	2·48	0·7
Geraldton	2·81	6·93	3·80	1·69	47·92	10·29	37·31	28·51	5·98	9·13	6·53	5·32	0·36
Gindie State Farm ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Herberton	0·51	1·27	0·61	0·78	12·41	2·28	3·52	0·70	0·81	1·22	0·20	0·75	0·50
Hughenden .	Nil	1·67	1·94	1·05	7·55	1·55	2·86	...	Nil	1·71	1·37	0·33	0·8
Kamerunga State Nurs.	...	3·64	1·69	...	...	3·52	...	4·95	0·97	...	...	...	...
Mackay	2·27	1·80	2·57	0·02	15·00	1·36	9·00	2·59	2·33	2·05	4·00	0·75	0·73
Rockhampton	0·20	2·14	2·47	1·37	9·01	2·01	1·68	1·21	0·03	1·33	2·99	1·37	1·20
Townsville	0·28	1·58	1·26	0·07	6·94	1·70	7·01	1·28	1·07	1·51	0·83	0·57	0·12
South.													
Biggenden State Farm	1·39	1·80	2·12	3·66	7·37	2·68	2·45	2·00	0·72	2·60	4·01	1·78	0·29
Brisbane	0·67	1·77	2·25	1·28	1·99	2·72	2·65	4·67	0·82	1·75	2·10	2·44	2·74
Bundaberg	1·10	2·39	0·73	3·34	6·52	3·70	5·06	1·54	0·67	1·51	5·65	1·66	0·98
Dalby	1·13	2·55	3·65	1·56	1·46	3·55	0·99	1·60	Nil	1·87	1·19	3·13	0·47
Esk	2·16	1·29	5·99	3·62	2·64	3·21	3·27	5·03	0·36	2·43	2·74	3·31	2·60
Gatton Agric. College	1·84	1·93	5·71	1·29	1·94	5·00	3·18	3·82	0·32	1·22	2·02	2·09	2·29
Gympie	1·37	2·49	2·58	3·97	3·86	3·77	3·41	2·34	1·15	2·96	4·70	2·80	1·70
Ipswich	1·19	1·48	5·09	1·05	1·37	1·95	2·66	4·56	0·05	1·31	1·67	1·34	3·55
Maryborough	1·05	1·84	1·92	1·64	8·36	7·11	2·28	2·4	0·91	2·57	5·02	2·53	1·56
Roma	1·12	2·15	2·79	1·68	5·19	4·85	4·18	1·91	0·44	2·73	1·54	4·83	0·12
Roma State Farm ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tewantin	2·18	2·30	7·50	4·12	6·44	3·31	4·34	9·37	1·00	3·24	4·08	4·24	1·38
Warwick	1·96	0·96	5·28	2·02	0·87	0·82	1·30	2·21	0·70	1·23	2·04	2·28	1·77
Westbrook State Farm	...	...	2·05	...	...	2·61	1·43	...	...	...	...	...	...
Yandina	1·50	3·10	6·03	2·75	6·69	6·42	3·71	5·25	1·10	2·70	3·70	5·91	3·84

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND,
Divisional Officer.

The Horse.

PURE-BRED ARAB'S SPEED.

Hundred Years behind English Thoroughbreds.

At the recent sale of pedigree Arab stock at Crabbet Park, England, Mr. Wilfied Scowen Blunt made a speech in which he related some interesting experiences on the breeding of Arab stock. He recalled that twenty-seven years ago the idea of producing a racehorse out of pure Arab stock was taken up by the Jockey Club, and that Lord Calthorpe, Mr. Chaplin, and Prince Batthyany had agreed to give prizes at Newmarket for Arabs. The idea was soon abandoned,. for the English horse, which was three parts Arab, had been bred for speed for over 200 years, and the Arab could not catch him up during a man's lifetime. In trying to improve the Arab in the way of speed they risked losing the qualities for which he was prized—namely, his short strong back, his wiry sinews, his iron feet, and that nice balance of all his machinery which makes him the perfect horse he is.

Mr. Blunt was convinced that the Arab had in him the potentiality of high racing speed. The late Lord Bradford, he related, had proved that in conjunction with English his stock could win against English thoroughbreds. The best instance of this was when, in 1882, the late Duke of Westminster bought one of the Crabbet mares—Basilisk—and put her to his Derby winner Bend Or. By him he had a filly which he sold to Lord Bradford, who put her to his Chippendale, the produce of this second cross being a colt, who in 1894 won the Dee Stakes. Lord Bradford also won many hurdles races with another half-Arab colt by Chippendale out of another of the Crabbet mares—Purple Iris—the produce in this case of a first cross. What was specially remarkable about both these cases was that the original Arab mare Basilisk was quite a small one, hardly over fourteen hands, while neither of the mares had individually the least turn of speed.

As to the Arab market, Mr. Blunt stated that he had heard from the largest Arab breeder in Continental Europe that the Arab stallion for half-bred stock was never so popular. He was selling freely to Germany, Austria, Italy, and Spain, all of which countries understood the Arab's merits, and employed him in their Government studs.

It has always been a matter of regret to him that so few first-class stallions had remained in England, where these would prove the best possible sires for hunter, no less than for polo stock. As it was, nearly all went abroad.—" Pastoralist's Review."

Poultry.

POULTRY DEGENERATING.

Some time ago, a farmer near Brisbane had a fine lot of Polish fowls. With these he took many prizes at various shows. By and by he found that his birds were deteriorating. They no longer had fine heavy top-knots, and, as show birds, they were not worth keeping. What had happened? A Michigan farmer gives a very good explanation of the cause.

Any of us can recall some instance in which someone has gotten a bad attack of hen fever, or a fever for some pure-bred fowls. We can also recall how this party would work early and late to fix a home for his fowls after they were purchased, besides reading all the poultry literature he could gain possession of. In nearly every instance the fowls respond to his labours by shelling out eggs at a lively rate. Then how he would talk of his big egg yields, thinking that he had the only fowls on earth worth keeping.

But just lay low a year. When the routine of poultry keeping gets to be an old story he will neglect the duties that a year previous would never have been left undone, and what is the result? We meet him on the street and ask him how his hens are laying. He will probably say, "Oh, just fair," but if you press him a little he will probably tell you he has been so busy with other work that he hasn't given them the care and attention that he ought and they are not laying well. Just watch him for another year or two and I will wager that you will find him out of the poultry business and, when asked about it, he will tell you that those pesky hens were a lot of work and bother, and that they ate their heads off after the first year.

There is no question but what the ancestors of our domestic fowls, no matter whether they are black, white, brown, or red, were the red jungle fowls of India. These fowls resembled the Indian game in size and shape. The home of these fowls was in the forests and thickets, where they lived generally in small colonies, and after the harvests they would roam the cultivated fields in search of stray heads of grain. The hen would lay from ten to fourteen eggs on the ground in the thicket, where she would hatch her little brood twice a year, such a thing as an unfertile egg being unknown.

Compare this natural poultry breeding with our poultry farms of to-day, where thousands of hens are kept, some of them laying over two hundred eggs a year, and on many farms the hens not allowed to sit at all. Incubators are used for hatching and brooders for brooding, while the hens are kept steadily grinding out eggs. Some poultrymen go so far as to say that chickens hatched in an incubator for three or four generations have the desire to sit bred out of them.

Some of our best egg yields are made by flocks owned by beginners, the beginner often beating the old-time poultry keeper by a long way. There is a reason for this: the beginner generally has a new building, and the most up-to-date fixtures; his runs are on new ground, and his fowls are not run down by in-breeding. As poultry keeping is a new thing to him he takes better care of his fowls, fights the lice harder, and gives a greater variety of food than does his brother who is an old hand at the business.

I think in-breeding weakens more flocks than any other one thing except lice. At the same time I believe in in-breeding, but it must be done systematically and according to well-defined principles or the result will be swift deterioration.

Do not allow your fowls to "run out" from neglect, breed from your best, keep your houses clean and free from lice, do not allow the runs to become contaminated, supply a sufficient amount and variety of food, give them your best care and you will have no chance to complain of a "run-out" flock.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND AND BRITISH NEW GUINEA.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order TILIACEÆ.

TRIUMFETTA, Linn.

T. plumigera, *F. v. M.* Leaves rough, with a thick subfulvous indumentum. Sepals 2½ lines long, exclusive of the horn, ⅓ line broad; or dorsal appendage horn ½ line long, inserted less than ¼ line below the apex. Petals oblanceolate, 2 lines long, ¾ line broad, lower portion about ⅓ line, pubescent inside and ciliate. Stamens 10. Ovary globose, 3-celled. Capsule globose, setæ 3 to 4 lines long, pilose, denser towards the end.—T. A. Sprague, Ex. Kew Bull., No. 6, 1909.

Hab.: Endeavour River, *A. Cunningham.*

Order LEGUMINOSÆ.

SUBORDER PAPILIONACEÆ.

Scorpiurus, *Linn.: Benth. and Hook.* Gen. Pl. i., 508. Calyx campanulate, the two upper teeth connate. Petals unguiculate; keel incurved, rostrate. Stamens diadelphous; alternate filaments dilated; anthers uniform. Ovary sessile, cylindrical, multiovulate. Pod subereta, circinate, ribbed, articulated, indehiscent. Seeds subglobose or oblong.

S. subvillosa, *Linn.* Caterpillar Pod. A hairy annual plant; leaves simple, entire 3 to 5 in. long and from ½ to 1 in. broad, veins nearly parallel. Flowers yellow, in umbels of about 4. Stamens diadelphous, 9 joined and 1 free; pods glabrous, about 1 in. long, zig-zag, the inner ribs naked, the outer 6 or 8 bearing stiff, crowded prickles which are a little hooked at the apex. The whole plant more or less hairy. A native of the Mediterranean regions.

Hab.: This plant has become naturalised near Roma, *R. J. Scott.*

Order MYRTACEÆ.

EUCALYPTUS, Lhér.

E. Stoneana, *Bail., sp. nov.* (After Herbert Stone, F.L.S., F.R.C.I., author of "The Timbers of Commerce and Their Identification.") Bastard Gum-leafed Box of the locality. Plates XXXI. and XXXII. A large tree with a rather close, hard, persistent greyish bark, about ½ in. thickness. Wood, outer yellow, inner red. Branchlets angular, slender, and probably more or less glaucous when fresh. Leaves alternate, thin-coriaceous, 6 to 10½ in. long, from 7 lines to 3 in. wide, broadest and roundly-cuneate at the base, the apex blunt or acuminate; margins more or less repand, midrib alone prominent, principal parallel transverse nerves distant, but faint like the reticulate veins, the intramarginal nerve always close to the edge of leaf. Oil-dots very numerous and minute. Petioles slender, from ½ to 1¼ in. long. Inflorescence axillary, panicles elongated, primary peduncles about 1 in. long,

secondary 9 lines, irregularly angled, bearing umbels of from 2 to 6 flowers, often somewhat crowded at the end of the branchlets. Flowers when fully expanded about 1 in. diam. Operculum thin, hemispherical, or with a very minute point. Stamens about 4 lines long, inflected in the bud, all fertile, in 3 irregular rows. Anthers globose, bursting at the top. Style slightly exserted, stigma peltate, scarcely larger than the style. Fruit oval-globose, including the pedicellate lower half about 8 lines long, diameter about 4 lines at the top, the outside upper portion smoothish, the lower pedicel-like portion angular; rims thin-capsule deeply sunk, the top dome-shaped; cells 4 or 5. Seed dark-brown, bluntly triangular to thick cuneate and furrowed, about 1 line long.

EXPLANATION OF PLATES.

A. Bark. B. Sapling leaf. C. Fruiting branch. D. Section of fruit, one 4 one 5 celled. E. Fertile seeds (enlarged). F. Flowering branch, showing full expanded flowers and in the bud, so as to show the form of operculum. G. Stamens (enlarged). H. Showing top of ovary style and stigma enlarged.

There are a few species to which this new one approaches in one or two particulars, but to none can I place it as a close ally.

Hab.: About Stannary Hills, *Dr. Thos. L. Bancroft*, Sept., 1909. The leaves were infested with *Phyllachora rugulosa*, Cooke. No special use is at present, the collector informs me, made of timber.

Order ARALIACEÆ.

SERIES MACKINLAYIEÆ.

MACKINLAYA, F. v. M.

M. confusa, *Hemsl.* Kew Bot. Bull., No. 6, 1909. This species is but imperfectly known. The author says: A glabrous shrub, branches of inflorescence somewhat slender. Leaves digitately 5-foliolate, the upper ones pedatipartite, 6 lines diam., shortly petiolulate; leaflets very unequal, 2 lower intermediate adnate, sessile, narrow-lanceolate, 2½ to 5 in. long, entire, obtuse, the other distinctly petiolulate, with petiolules about 7½ in. long, petioles 1½ to 2 in. long, the upper medium ones 3-lobed, lateral lobes much shorter; lower leaves larger, nearly elliptic, lobed. Inflorescence terminal, stipitate, stipes 7½ to 10 in. long, composed of umbels 7½ to 10 in. diam.; primary rays 15 to 20, slender, 2½ to 5 in. long, the ultimate umbels 3 to 6 flowers; pedicels nearly capillary, unequal in length; bracts linear-lanceolate, ½ to 7½ in. long, very much acuminate; bracteoles similar but smaller. Female flowers and fruit unknown.—Ex. Kew. Bull. l.c.

Hab.: Dunk Island, Rockingham Bay, *John Macgillivray.*

Order EUPHORBIACEÆ.

EUPHORBIA, Linn.

E. Helioscopia, *Linn.* The European Sun Spurge. An erect or ascending Annual, 6 or 8 in. to a foot high, simple or with a few branches ascending from above the base, the stem and branches more or less clothed with long weak hairs; stem leaves obovate or broadly oblong, and narrowed into a short stalk, floral leaves broadly obovate or orbicular, all very obtuse and minutely toothed. Umbel of 5 rays, each ray once or twice forked at the end, but the branches so short that the flowers and floral leaves appear crowded into broad leafy heads. Glands of the involucre entire and rounded. Capsules glabrous and smooth. Seeds pitted. In cultivated and waste places, in Europe and Western Asia, extending further north than most species. Common in Britain.—Benth. Brit. Flora, ii., 729.

Hab.: This weed has become naturalised near Clifton, Darling Downs, and should it be found to spread to much extent over the pasture will likely prove dangerous to stock.

SARCOCHILUS, Br.

S. Longmanii, *Bail. sp. nov.* Stem about 1 in. long, the lower half bearing roots, the upper leaves. Roots white; attached to the stems and branches of other plants. Leaves linear apiculate, 5 on the plant received, falcate, light-green, 2 to 3 in. long, about 4 or 5 lines broad, midrib and numerous parallel veins, prominent, racemes longer than the leaves, slender, bearing about 10 pale-yellowish or cream-coloured flowers, the segments curving inward, thus almost cup-shaped. Bracts subtending; flowers ovate-lanceolate, about half as long as the pedicels. Pedicels 2½ lines long. Sepals and petals ovate, the latter being rather broader than the former; about 3 lines long, slightly stained near the base a yellowish-green. Labellum with sometimes a few reddish marks, the lateral lobes about as long as the petals, middle lobe more or less tomentose; disk calli erect. Column short. Pollen-masses a deep yellow.

Hab.: Main Range, near Toowoomba, *H. A. Longman*, Sept., 1909.

Order **SCITAMINEÆ.**

ALPINIA, Linn.

A. modesta (F. v. M. ined.) *K. Schum.* On Baron Mueller's label was the following brief description:—"Panicle almost racemose, calyx unilabiate, tridentate, teeth acute and tube split. Corolla-lobes 3, oval glabrous. Labellum rotund, very shortly trilobed, glabrous. Anthers without appendages. Style puberulous, filiform, stigma dilated, truncate."

Inflorescence on specimen about 1¼ in. long. Leaves grass-like linear lanceolate, sheath close to stem, lamina 6 to 8 in. long, ½ to ¾ in. broad, top of sheath ciliate.—F.M.B.

Hab.: Rockingham Bay, *Dallachy*, F. v. M.

FLORA OF BRITISH NEW GUINEA.

Order **SAPINDACEÆ.**

HARPULLIA, Roxb.

H. cupanoides (Roxb.), *Hook.* Fl. Brit. Ind. i., 692. A tree with straight trunk. Leaves 6 to 18 in. long; leaflets 2 to 9 in. long, 1 to 3 in. broad, alternate or opposite ovate or elliptic, somewhat coriaceous, lateral nerves neither stout nor approximate, base obtuse or cuneate, shortly petiolate. Panicles lax axillary, and subterminal erect (in flower), 2 to 9 in. long. Flowers pale-yellow or greenish, about 6 lines long. Calyx 2 or 3 lines long, somewhat tomentose, deciduous; partitions obtuse. Petals glabrous except the claw, obtuse. Capsule 1 by 1½ by 2⅓ in., compressed, pendulous, bright orange.—Hook. l.c. *H. imbricata*, Thwaites.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.* The tree is also met with in Burma, South Andamans.

Order **GERANIACEA.**

TRIBE OXALIDEÆ.

OXALIS, Linn.

O. (Biophytum, *DC.*) sensivitum, *Linn.* Stem long or short, slender or robust, hispidly pubescent. Leaves 1½ to 5 in. long; of from 6 to 15 pairs of leaflets, which are from ¼ to ½ in. long, oblong, nearly straight, except the

terminal, tip apiculate or not, nerves few or many, wavy. Petioles hispidulous or merely ciliate. Peduncles from 6 lines to 5 in. long, hispid, sometimes swollen at the top; bracts rigid, setaceous; pedicels usually short; sepals only a little longer than the sepals. Sepals rigid subulate-lanceolate, grooved, glandular, and hispid. Petals twice as long as the sepals, yellow or purple. Capsule elliptic, shining, cells few-seeded. Seeds with obliquely transverse tubercled ridges.—Hook. Fl. Brit. Ind. i., 436.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker*.

Order APOCYNACEÆ.

Tribe Plumerieæ.

Holarrhena, *R. Br. Benth. and Hook.* Gen. Pl. ii., 708. Calyx 5-lobed or partite, usually glandular within, lobes small. Corolla salver-shaped, tube slender cylindric, throat contracted, naked; lobes oblong, overlapping to the left. Stamens near the base of the tube; anthers oblong-lanceolate, mucronate, cells rounded at the base. Disk, none. Carpels 2, distinct; style short, filiform, stigma oblong-fusiform, top entire or 2-toothed; ovules many in each carpel. Follicles 2, elongate, spreading and incurved, terete. Seed linear or oblong, compressed, concave, tipped with a deciduous coma; funicle in the concavity, albumen scanty; cotyledons broad, complicate, radicle short, superior. Trees or shrubs. Leaves opposite, membranous. Flowers white, in terminal or subaxillary many-flowered corymbose cymes. Species about 8—tropical, Asiatic, and African.

H. antidysenterica (Wall. Cat.) Hook. Fl. Brit. Ind. iii., 644. A small tree with a pale bark, glabrous pubescent or tomentose, according to form or variety. Leaves deciduous, shortly petiolate-elliptic oblong, ovate or ovate-oblong, obtusely acuminate, 6 to 12 in. long, 1½ to 5 in. broad, base obtuse, rounded, or acute; nerves 13 to 14 pairs, strong, arched; petiole wanting or about 3 or 4 lines. Cymes 3 to 6 in. diam., corymbose, sessile, terminal; bracts small, ciliate; pedicels slender. Flowers inodorous, white, 1 to 2 in. diam., puberulous. Sepals acuminate. Corolla-tube very slender, 4 to 6 lines, lobes as long, oblong, tips round. Follicles 8 to 16 in. long, and about 6 lines wide, usually bearing longish white spots. Seed about 6 lines long, narrowly linear-oblong, glabrous. Coma 2 in. long.—Hook. l.c.

Hab.: Tropical Himalaya, and drier Indian forests; Malacca; Boku, British New Guinea, *Mrs. H. P. Schlencker*. Mrs. Schlencker's specimens were in bad condition and without flowers, but from the follicles and other parts of the plant I consider that they belonged to the above plant. Dr. Dietrich Brandis says that the bark, leaves, fruit, and seeds were formerly used medicinally.

Order VERBENACEÆ.

Tribe Viticeæ.

CALLICARPA, Linn.

C. Cana, *Linn. See* Queensland Flora, page 1274. Papuan name "Manutagi," *Mrs. H. Schlencker*.

Order SCITAMINEÆ.

ZINGIBER, Adans.

Z. officinale, *Rosc.* A very small form of the common ginger. Papuan name "Siwoga," *Mrs. H. P. Schlencker*.

Order COMMELYNACEÆ.

POLLIA, Thumb.

P. thyrsiflora, Endl. Gen. Stem stout, erect, creeping below; sheath pubescent. Leaves 10 to 12 in. long, $2\frac{1}{2}$ to $3\frac{1}{2}$ in. broad, oblanceolate, narrowed into a petiole of a few inches, glabrous, margins crisped. Panicle short, dense, ovoid, pubiscent. Bracts ovate, branches closely scarred; flowers crowded, stamens 6. Fruit ellipsoid, yellow-brown or dark-blue, smooth, dorsally compressed, cells many-seeded. Common on the Malay Islands.—Hooker in Fl. Brit. Ind. vi., 367.

Hab.: British New Guinea, *Mrs. H. P. Schlencker.*

Order LYCOPODIACEÆ.

SELAGINELLA, Spring.

S. gracilis, Moore, in Gard. Chron. 1886, i., 752, from Handb. of the Fern-lillies (J. G. Baker). Stem suberect, subasperous, 2 to 3 ft. long, copiously pinnately branched; pinnæ lanceolate, 4 to 5 in. long; branchlets erecto-patent, simple, the lower an inch long. Leaves green on both sides, moderately firm in texture; those of the lower plane ovate-falcate, not so close as in the closely allied species *S. Wallichii*, produced on the upper side of the midrib and rounded at the base, adnate to the stem on the lower side; leaves of the upper plane ovate-lanceolate, slightly incurved, cuspidate. Spikes slender, square, $\frac{1}{2}$ to 1 in. long; bracts crowded, ovate cuspidate, distinctly keeled. Hab.: Polynesia. I have a specimen from the Botanical Herbarium, Berlin, an entire frond bearing fragmentary spikes of spore-cases, named *S. aspericaulis*, A. Br., but from that and the specimens received from Mrs. Schlencker, which consists of the upper portion of a soriferous frond, I, like some others, cannot see a specific difference enough to separate these two plants—viz., *S. gracilis* and *S. aspericaulis*—so record Mrs. Schlencker's from Boku, British New Guinea, as *S. gracilis*, A. Br.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order FILICES.

POLYPODIUM, Linn.

P. pallidum, *Brack.*, **Aspidium tenericaule,** *Thw.* *See* Queensland Flora, page 1982.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

CRYSTALLISED BANANA.

A delicious sweetmeat is prepared from bananas in San Domingo in the following way:—Large, thoroughly ripe bananas are skinned, and the fruit is cut into thin slices about $\frac{1}{4}$ in. in thickness. These pieces are sprinkled with fine or powdered sugar, and placed in the sun on boards or trays. As the fruit dries, it is turned over several times, and each time dusted with sugar. In a few days it is sufficiently dry, and forms a crystallised conserve of delightful taste.—U.S. Consular Report.

Horticulture

STOCKS AND STOCK SEED.

It is rather late in the day to give any advice as to the saving of stock seed, but as seeds of the Ten-week varieties may be sown throughout the year, a hint as to collecting the seed may be useful. Look round for the likely seed-bearing plants. Select the very vigorous single-flowered plants which are growing near to the best of the doubles. To ensure good results, pull out the bulk of the singles, and leave only the few plants you intend having for seed. Watch these well. See that they get all the water and attention necessary. When the lower seed-pods have set, go to the plants and take off the first three or four. These are not taken by expert growers, who fancy that they usually give a big percentage of single-flowered plants. The four pods higher up the stem are the ones to be careful of. These have been proved over and over again to be the best. Allow no others to mature. Four pods on each good stout stem will be quite enough. Get these in nice condition, and you will have all the seeds you require. Saving every pod, as some folks do, is a waste of time. There are too many single plants in flower in our suburban and country gardens at this hour, and the majority of them are there because someone blundered over the seed savings. It is a great pity that any mistake is made, as stocks are now so good that one cannot well do without them for the winter garden. When our roses are resting, the stocks are at their very best. They are the best of all the cold season's flowers. Every year adds to their popularity.

When planting out stocks, some growers plant only the strongest and throw away the weakest. This is a mistake, for the weaker and smaller plants of a batch of seedlings almost invariably produce a larger percentage of double flowers.

CONSERVATORY AND POT PLANTS.

For decorating the plant house or conservatory in summer there is nothing so useful as the tuberous-rooted begonia. The plants will flower from December until April. In the old country they are used as bedding plants. The hot winds destroy the foliage in most parts of Australia, and on that account they have to be cultivated under shelter. Although the foliage is delicate, the plants are exceedingly hardy, and their cultivation may be undertaken by those who understand only a little about pot plant culture. The tubers will start readily enough in a cold frame if placed in a layer of leaf mould and sand, which should be slightly moistened. When growth commences, and the shoots are about one inch long, each tuber should be placed in a 3-in. pot. The drainage must be free. It will be sufficient if the tuber is just covered with soil. The most suitable compost consists of two parts of fibrous loam, one part of well-decayed cow manure, and half a part of clean, coarse sand. Those who intend to cultivate tuberous begonias should purchase the tubers while they are dormant. They may then be kept under proper conditions until growth commences in a natural way in spring. When the plants start to grow, they must be potted on, several times until they occupy 10 or 12-in. pots, in which they may be permitted to flower.

Tropical Industries.

LABOUR AT HOME AND IN THE TROPICS.

There is a common, in fact a general, idea—for the exceptions are few and far between—that it is derogatory, and, in fact, inconceivable that white folks should go to the tropics and work as estate labourers or small peasant proprietors, like "niggers" and "coloured people." The excuse given is, more often than not, that the climate would render this impossible, and that if the parents themselves did not quickly die, their children would, or at the best grow up pale-faced, emaciated wastlings, an advantage and a credit to no one. On account of this, therefore, huge areas of land lay undeveloped and unproductive where Europeans could settle and work—work like "niggers"—and be all the better for it; far better than to remain at home, if they persevere, for the good of themselves, their children, and the Empire at large. Perchance the parents may get knocked up, and even die, but we shall show that at times, life at home deals no more kindly with them. In course of time, however, when the second and third generations come along, it would be found that a large proportion have become acclimatised, and are very much better off, as a body, than if they had remained at home. Statistics, it is said, prove everything. By them social reformers claim that the status of living in England has been raised enormously, and the wealth of the country increased. This is undoubtedly true, but statistics also show that a very large and very valuable national asset, in the shape of at least a million adults and children, are not only allowed to run to waste, but remain in the midst of their more fortunate brothers and sisters a diseased and festering sore, slowly but surely spreading about and around the human social body, wherever and whatever they come into contact with—Poor Law officers, or their relations and friends. The Minority Report of the Royal Commission on the Poor Laws and the Relief of Distress in the United Kingdom proves this beyond a doubt. This Minority Report costs, in London, 1s. 9d. only, and is well worth studying by employers of labour in the tropics, especially cotton-growers, coffee-planters, &c., needing a large quantity of light labour; for though we fear the day is long distant when the starving poor in England will find work and food, and, above all, a pleasant, healthy, out-of-door life among trees and vegetation the most beautiful in the world, that need not prevent the more far-seeing ones from thinking it over and seeing if they cannot make a start in helping to relieve the appalling misery and lack of employment at home.

When with the early settlers in America, the struggle for existence became so acute that life was only possible by each man and woman doing their very utmost to secure a living, Captain John Smith it was, we believe, who stood guard over the community and threatened to shoot, or, worse still, to turn adrift among the Indians, any idler among them. This is the class of autocrat that is needed in many places to-day; the pity is he is not there, or, if so, the law cannot allow him to act in such a capacity. If the Empire is to hold together, much less to further develop and reign supreme against all comers, it behoves every one of us, both at home and abroad, to see that he does his utmost to help to increase the average wealth and necessary comfort of the country at large. Those who are not doing so are just as great traitors as the soldiers who refuse to fight when they are needed. Fortunately, there is no need to be always fighting, at any rate with powder and shot; but there is an absolute necessity for the members of this Empire to be always fighting—and fiercely fighting—to keep up and maintain the mother-country and her children as they should be. As soldiers cannot fight well without being trained, neither can civilians work steadily without being steadily in work. The

children, instead of being herded with undesirables in the workhouses, should be reared in agricultural districts, amid surroundings conducive to a steady agricultural career, and so learn to become agriculturists rather than townsmen. If work cannot be found for them in England, the rest of the Empire, with lands to develop, must be placed at their disposal, where they can obtain employment, first under others, and later for their own account, possibly on co-operative lines: and it must be seen, in the absence of any other remedy, that the children on this side are trained up and taught agricultural and other country pursuits, causing their love for the country rather than town to be developed, as by doing so we fit them to become settlers in the colonies and elsewhere, and so help to increase the demand for manufactured goods from this side in exchange for the raw material that they will produce and ship over to us. Queensland could grow thousands of bales of cotton by means of such labour alone, and if those sent out are steady and pushing, they could, after a time, cultivate their own piece of land instead of working for others. The higher lands in British Guiana are untouched; opened out, they would, from all accounts, be as healthy for Europeans as the higher veldts in Africa. The profit may not, at first, be large, or even adequate, but it would be far better in all ways than living in squalor over here, and would in the aggregate swell the trade of the Empire to a considerable extent—an increase that would be greatly welcome just now.

At present we are told that £4,000,000 a year is spent—one might almost say mis-spent—on outdoor relief alone. "A large part of this sum," says the Minority Report (p. 692) already referred to, "is a subsidy to insanitary, to disorderly, or even to vicious habits of life. The saddest feature of all is that no small proportion of the 240,000 children whom, in the United Kingdom, the Destitution Authority elects to bring up upon outdoor relief—in the course of a year, probably as many as 600,000 different children—are to-day chronically underfed, insufficiently clothed, badly housed, and in literally thousands of cases actually being brought up at the public expense, in drunken and dissolute homes"—homes some of which are "in (p. 41) a state of indescribable filth and neglect, the abodes of habitual intemperance, and disorderly living," where "overcrowding is of such a kind that ordinary decency is impossible"—and "many of the houses stood forsaken, with broken windows and doors, dirty, forlorn, and tumbling to pieces."

With such a state of affairs as this in a civilised country, are we wrong in suggesting that the surplus population goes, or is sent (of course, at their option to remaining here to starve) to the tropics and sub-tropical countries to supply badly-needed labour, and to live a life that must be brighter and healthier, or, at any rate, that cannot be worse than is, in many cases, the one at home, whilst the future prospects for the steady worker are decidedly more hopeful?

If the life is not congenial, or the labourer unsatisfactory, he must be brought home. The cost of doing so can easily be arranged between the colony and the Home Government. When we have labour colonies established on this side, the healthy, able-bodied won't-works can choose between them and the colonies, for once a man or woman is sent back in disgrace he or she will never return, if able-bodied, but be sent to a labour-colony. Hence they must choose between working diligently of their own free will abroad, or having to do so by force over here. Even if this class of labour is at first confined within prescribed limits (the women and children for their own sakes), call it if you like by the proper name, "compound" (until the colony recognises them as steady workers, and is willing to let them live elsewhere, or they themselves feel safe in going), could that be more distasteful than some of the larger, and from all accounts, many of the smaller workhouses on this side, where paupers of both sexes (p. 7) and all descriptions, aged and impotent, blind people and idiots, and the sick, are often immured. Nothing could exceed the degradation and demoralising effect of putting healthy, able-bodied adults and children

with such associates; far better give them a chance to work where they are wanted, where, if they sicken and die, they will do so to a much smaller extent than they do over here, and at least under pleasanter surroundings, but where —if, as the majority will, they survive, and learn to work and to prosper in body and mind—they will prove as great a blessing to themselves and to others as they now seem to be a nuisance.

Since writing the above we see by the London "Evening News" that Mr. Sylvester Browne, a well-known New South Wales pastoralist, and his brother, the novelist "Rolf Boldrewood" (author of "Robbery Under Arms"), have addressed the most important newspapers in Australia on the subject of handing over the Northern Territory to the direct control of Great Britain for a period of years, so that the Imperial Government may systematically settle the territory with deserving unemployed.

The suggestion has created much interest. It is recognised by sections of the Australian public that the development of the huge area of the Northern Territory (which covers an area of 523,620 square miles) will strain the Commonwealth's financial resources, and if thousands of British men and women with none of coloured races could be settled there, Australia, it is claimed, would be immensely served. The country is tropical, but is on the whole well watered, and gives promise of success in the cultivation of sugar-cane, coffee, rice, indigo, maize, and rubber. It is also adapted to cattle and horse breeding. —"Tropical Life."

THE NORTHERN BANANA INDUSTRY.

The probability of a revival of the important Northern industry of banana-growing in the near future has been confirmed by Mr. Turner, Chief Victorian Inspector, who, in company with Mr. E. G. E. Scriven, Under Secretary for Agriculture and Stock, visited the principal centres of the industry in the North during September and October last.

At Cairns the visitors attended a meeting of banana-growers, and Mr. Scriven, in addressing them, said that during the past eighteen years Queensland had sent to Victoria some millions of bunches of bananas, and prior to inspection a large quantity of fruit containing the larvæ of the fruit fly must have been introduced; yet it could not be said that the fly had ever been acclimatised in that State. Last month he (Mr. Scriven), whilst in Melbourne with the Minister, had asked the Victorian Government to allow Mr. Turner to visit Queensland, and see things for himself. On his return, that gentleman would present a report to his Minister, and it was hoped that in future there would be no fear regarding the banana industry in Queensland. He hoped also that arrangements would be made under which bananas could be shipped in a fair business condition, instead of in an immature state, as seemed to be required under present regulations. There was no reason to doubt that if good bananas were sent down from this State they would hold their own. Of course, they had a handicap in the reduction of the import duty by the Federal Government; but that was a matter with which the State Minister could not interfere. It was for all those interested in banana-growing to represent their views to their Federal members very strongly, and not cease urging until the matter was arranged. He assured them that the State Government had been fighting all the time in their interests; and the Minister had always tried to help them whenever he could.

Mr. Turner, after an expression of admiration and surprise at the beauty of the scenery shown him in North Queensland, expressed his regret at the decline in the banana trade. Speaking officially, he could say that the best of good feeling prevailed between Victoria and Queensland; and the enormous drop in the banana trade between the two States called for thoughtful consideration. Bananas were one of the staple foods of the people of Victoria,

being found on the table of all classes. It would be a most regrettable thing if the trade became extinct, and the same applied to other tropical fruits. From what he had seen of the lands at the Mulgrave, the banana should prove a profitable investment, and he had great hopes for the resuscitation of the industry here, and in other parts of the North. There had been a lot of talk about the competition of Fijian bananas; but whilst in Sydney, some of the Fiji shippers had said to him:—"We will not touch Melbourne, as we cannot get the price we want for our bananas." The Fiji bananas were 2s. 6d. a dozen now; as against 6d. for those from Queensland. In view of this, what chance had Fiji against Queensland? He did not think they had anything to fear in this direction. Mr. Turner explained that it was not necessary that the bananas should be sent from the gardens green and hard. If the fruit arrived at Melbourne in a ripe condition and was sound, there was no fear that it would be condemned. The Department did not bother now about netting, and, summing up, Mr. Turner spoke very optimistically regarding the future of the industry here. He assured the growers of his sympathy, and explained fully the methods of shipment, &c., not only in connection with bananas, but mangoes, granadillas, &c. He hoped more restrictions would be removed, and wished the growers every success in their labours.

MEMORANDUM ON THE CULTIVATION AND PREPARATION OF GINGER.

Ginger is the underground stem (rhizome) of the plant known botanically as *Zingiber officinale*, indigenous to the East Indies, but now cultivated in many tropical countries, such as the West and East Indies, West Africa, and Queensland.

Cultivation.

Two methods of cultivation are adopted. That by which the best ginger is obtained consists in planting in March or April (in Jamaica) portions of selected rhizomes from the previous year's crop, care being taken that each portion of rhizome planted contains an "eye" (embryo stem). These portions of rhizome are placed a few inches below the surface of the prepared soil and about one foot apart, the process being much the same as that observed in planting potatoes. It is advisable to thoroughly clear the land of weeds before the sowing of the rhizomes is done, as otherwise the removal of weeds becomes difficult later on when the ginger plants have developed. Unless the rainfall is good, it is necessary to resort to irrigation as the plants require a good supply of water. The ginger produced in the foregoing way is known as "plant ginger."

"Ratoon ginger" is obtained by leaving in the soil from year to year a portion of a "hand," *i.e.*, roots and a portion of a rhizome containing an "eye." This "eye" develops in the normal way, giving rise to a supply of rhizomes in the succeeding season. "Ratoon ginger" is smaller and contains more fibre than "plant ginger," and the product obtained by this means is said to deteriorate steadily from year to year.

The foregoing relates mainly to the cultivation of ginger as followed in Jamaica. The plan adopted in Cochin (India) differs from it but little. In the latter country the land is ploughed two or three times before the rhizomes are planted, and these are usually placed about 9 in. apart in parallel furrows 15 in. apart. The field is then covered over with the leaves of trees or other green manure to keep the soil moist, and over the leaves organic manure is spread to a depth of about half an inch. At the end of the rainy season it is necessary to resort to irrigation. During the first three months of the dry season the field is weeded about three times.

Collection and Preparation of the Rhizomes.

"Ratoon ginger" is gathered from March to December, but "planted ginger" is not ready for digging until December or January, and from then until March is the ginger season. The rhizomes are known to be ready for digging when the stalk withers, this taking place shortly after the disappearance of the flowers. The plant flowers in September in Jamaica. The rhizomes are twisted out of the ground with a fork. In performing this operation great care is necessary, as any injury inflicted on the rhizomes depreciates their market value. Considerable experience is necessary in order to lift ginger rhizomes properly.

The "hands" (complete rhizomes and adherent fibrous roots) are piled in heaps, the fibrous roots are broken off, and the soil and dirt removed immediately, as otherwise it is difficult to get the finished ginger white. The roots should not be allowed to lie in heaps long as they are liable to ferment. The usual plan is, as soon as the roots and excess of soil have been removed, to throw the ginger into water to be ready for "peeling or scraping." This is done by means of a special knife consisting merely of a narrow straight blade riveted to a wooden handle. The operation of peeling is a very delicate one, the object being to remove the skin without destroying the cells immediately below it, since these cells contain much of the oil upon which the aroma of the best qualities of ginger depends. As fast as the roots are peeled they are thrown into water, and washed, and the more carefully the washing is done the whiter will be the resulting product. As a rule the peeled "hands" are allowed to remain in water overnight. Some planters in Jamaica add a small proportion of lime juice to the wash-water at this stage. After washing, the peeled rhizomes are placed in a "barbecue," which consists merely of a piece of levelled ground covered with cement, on which the ginger is placed to dry in the sun. Where a "barbecue" is not available a "mat," consisting of sticks driven into the ground across which are laid boards, palms or banana leaves on which the ginger is exposed until it is dry, is used. Careful planters put their ginger out daily at sunrise and take it in each night at sundown; conducted in the latter way the operation of drying takes from six to eight days.

The finished ginger is graded according to size and colour of the "hands," the best grades consisting of the large plump "hands" free from traces of mildew, and the poorest the shrivelled dark-coloured "hands." As a rule the crop is divided into four or five grades. The best "hands" obtained in Jamaica weigh as much as eight ounces, four ounces being an average weight.

Unpeeled ginger is merely freed from its rootlets and excess of soil and then thoroughly washed in water and finally dried in the sun. Much of the Cochin ginger is placed on the market in an unpeeled condition, but the best grades are peeled in the same fashion as in Jamaica and fetch similar prices in the United Kingdom.

Soil and Manure.

Comparatively little attention has been paid to the nature of the soil best suited to ginger cultivation, and to the kind of manure which should be employed to fertilise soils exhausted by ginger crops. In Jamaica the primitive plan of clearing forest lands by fire has been largely followed, and on this cleared land ginger is grown until the soil becomes exhausted, when it is abandoned and a new piece of land put into cultivation. This wasteful method has resulted in the production of large tracts of exhausted land which are no longer under cultivation in the colony, and the reclamation of which is still an unsolved problem. (See Kilmer, "Bulletin, Department of Agriculture, Jamaica," 1898, V., p. 241.)

In Cochin, on the other hand, manuring is regularly practised, the manures generally employed being oil-cake or dung. The principal constituents removed from the soil by ginger are stated to be lime, phosphoric

acid, and soda, and it is the replacement of these constituents which should be aimed at. The soil should be readily permeable by water, as if this collects about the rhizome, the latter is apt to rot. The best varieties of Jamaica ginger are grown on a sandy loam, and in India the ginger produced on the compact black soils is said to be poorer than that grown on the lighter sandy soils.—"Imperial Institute."

A VALUABLE TEXTILE PLANT.

(*Asclepias semilunata*, N. E. Brown.)

From a botanical point of view, the family of the Asclepiadaceæ is highly interesting. All the plants belonging to this family contain latex; certain species, indeed, are said to furnish good rubber. Furthermore, all the Asclepiadaceæ except *Finlaysonia* and *Sarcolobus* have seeds furnished with a tuft of silky hairs longer or shorter according to the species. This last circumstance gave rise to the idea that, in this family, certain species might be interesting as textile plants, but experiments made with the silk of *Colotropis procera*, R.Br., and with certain Asclepias have shown that the fibres are too brittle and cannot be utilised in the textile industry.

However, recently, an English official, in the Uganda Protectorate, has obtained certain proof that one species of Asclepias, extensively distributed in Africa, can be utilised for this purpose. Having one day requested a native to procure him some fibre which he wanted for work on his rubber plants, on Lake Victoria Nyanza, he expected the boy to obtain it from banana plants. But, to his surprise, he saw him take it from a totally different plant . . . from which he extracted the fibre and manufactured some very strong cord. Mr. White forthwith sent specimens of the fibre and of the plant to the Imperial Institute in London, where the latter was recognised as *Asclepias semilunata*, N. E. Brown, and the fibre, properly prepared, was valued in the London market at £35 per ton.

Compared with the price obtained for other fibres and the better sorts of cotton, this price places the fibre furnished by the *Asclepias semilunata* at the head of all vegetable textiles in company with Manila fibre, the finest kinds of Sansevieria, and far surpassing Ramie, Sisal, and Jute.

This fibre is irreproachable in colour and length. An examination of the Uganda specimens showed it to be extremely strong, of splendid quality, and, without any doubt, well adapted for rope-making. As yet it has not been exported in sufficient quantity for actual industrial purposes. It is possible that this fibre may also be used for the manufacture of explosives; but this question is still being studied.

According to Mr. White, the plant is indigenous on the Congo, in Uganda, and in Abyssinia; but it adapts itself to various climates, for, in the course of his travels across Africa, he found it from the Zambesi, in Portuguese Africa, and thence to the Equator and to the Congo. In all these districts, it grew in isolated places, but was nowhere cultivated. No one knew anything of its economic value.

The plant accommodates itself to all sorts of situations, seeing that it has been found in South Africa and in Rhodesia at an elevation of 225 metres above sea level; but it has never been seen near the coast, although it may possibly succeed there.

Its cultivation is very simple. It is sown like any ordinary cereal, wheat or barley; it is sown thickly so as to produce stems from $1\frac{1}{2}$ to 2 metres ($4\frac{4}{5}$ to $6\frac{2}{3}$ ft.) high. This species will thrive in stony soils, on plains, or on hill sides; it does not require irrigation, and defies drought. From the above it will be seen that this plant may constitute a source of revenue in districts which cannot be otherwise utilised.—"L'Agronomie Tropicale."

Science.

DESTRUCTION OF PRICKLY PEAR WITH ARSENICAL SPRAY.

Prepare a concentrate by mixing intimately, 10 lb. arsenic (preferably Red Rose Arsenic, which is the cheapest and most soluble form in the market), $3\frac{1}{2}$ lb. caustic soda (75 per cent., the most economical form), and slowly and carefully add cold water to make 8 gallons of concentrate. The heat generated spontaneously by adding the water to the mixed dry chemicals is generally sufficient to dissolve all the arsenic, but should, after standing, some of the arsenic be found undissolved settled on the bottom of the drum, boiling of the concentrate for a few minutes will be necessary. Boiling is nearly always required if other arsenic but Red Rose are used, as they are more crystalline and coarser powders.

The 8 gallons of concentrate will make 100 gallons of spraying solution, which contains 1 oz. of arsenic in soluble form, by simply diluting with the necessary amount of water.

When preparing the concentrate, great care has to be taken, and the vapours of the boiling liquid should never be inhaled; again, when mixing solutions and spraying, all unnecessary contact of the arsenical liquid with any part of the human body must be avoided.

When very young pear plants are sprayed, it will be often noticed, more particularly during periods of vigorous growth, that the spraying liquid does not adhere to the leaves, but runs off in drops, and making the spraying much less effective. This trouble may be overcome by adding to the arsenical spray another solution which makes the liquid more adhesive, and which is prepared by dissolving 1 gallon of Stockholm tar, or 1 gallon of coal tar, or 10 lb. of common rosin, with 2 lb. caustic soda in about 2 gallons of boiling water, and keeping the mixture boiling until the whole of the tar or rosin has been saponified or made soluble. Not all coal tars dissolve readily, and for this reason the expensive Stockholm tar has to be used.

I do not recommend the preparation of spraying solutions on a small scale, but always advise to buy concentrates from manufacturers, who obtain regular supply of the best chemicals at a much cheaper rate than the public, and all dangers in the preparation are avoided.

There are a number of proprietary pear-destroying concentrates which are prepared pretty well in accordance with the lines laid down in this memorandum.

When spraying the pear plants, sufficient amounts of liquid have to be used to form a fine film over all the leaves, and, if possible, large plants should be cut and slashed about before spraying.

The addition of other chemicals to make the dead pear burn more readily is not necessary. The effect of the spraying is always apparent in a couple of days, and after a couple of weeks the dead pear is generally dry enough to burn readily.

It will be always better if the dead pear is dragged off and put into heaps, in order to see if any young small plants have escaped spraying, and a second, lighter spraying is generally necessary in badly infested country.

12-10-09. J. C. BRÜNNICH.

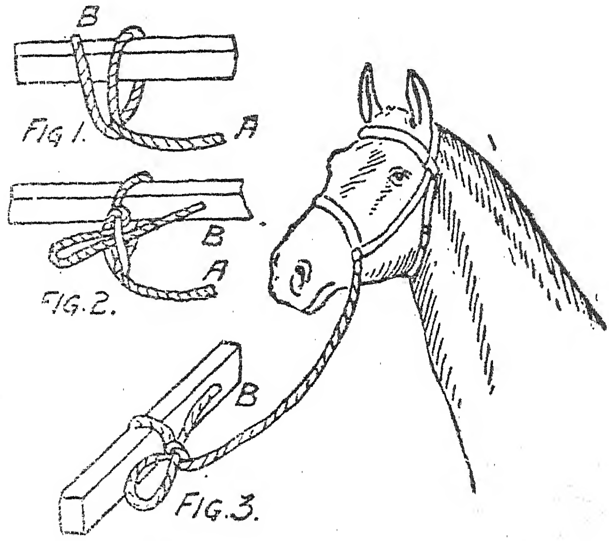
General Notes.

ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE AND STOCK FOR 1909.

The annual report of the Under Secretary of this Department, which was issued early in October, is more than usually interesting, and its contents furnish a fund of information concerning the position of the agricultural, pastoral, and other industries of the State. There are practically no subjects of interest to the man on the land which are not more or less dilated on, whilst the voluminous tables in the Appendix, supplied by the Government Statistician, give a further value to the report, which should commend it not only to dwellers in our own State, but also to all who take an intelligent interest in the progress and welfare of this, the most resourceful of all the States of the Commonwealth.

TO TIE UP A HORSE.

One of the most secure, yet simple methods of fastening the halter or headstall rope, of a horse, cow, or other animal to a rail, or even a ring, is shown in our sketch (from the "Farm, Field, and Fireside"). The knot can be speedily and easily unfastened, whilst it is impossible for the animal to untie or loosen it by pulling at the rope, as the harder the latter is pulled the tighter the knot becomes. Sketches 1 and 2 illustrate how to proceed in fastening the rope, and 3 shows the fastening completed, A indicating the halter end and B the leading end of the rope. Pass the end A over the rail from the under side and under rope A, thus forming a loop, as Fig. 1. Then pass B over and under the loop last named, forming a second loop, and



leaving another loop on B by not pulling the whole of it completed through, as shown in Fig. 2. Tighten the second-made loop, afterwards pulling rope A to tighten and complete the whole. To unfasten simply take hold of end B and pull sharply. Reference to the sketches and a few trials with a piece of rope will illustrate in a practical manner the simplicity and value of this knot.

TUBERCULOSIS IN MAN.

Caused by Accidental Infection from a Tubercular Pig.

A most interesting case is recorded in a recent issue of a Dutch veterinary journal, which gives a notable illustration of how tuberculosis of the lower animals can be transmitted to and from man.

A veterinary inspector engaged at the Amsterdam abattoir, while dividing a tubercular gland in the carcase of a sow, accidentally cut his hand, and though treatment was at once applied to the wound, it proved very difficult to heal. When at last it closed, a small, hard swelling commenced to form on the spot, this gradually increasing in size until, two months from the time of infection, it was removed by operation. After its removal, microscopical examination proved it to be of a tubercular nature, the specific germs of the disease being found present. In addition to this examination a guinea-pig was inoculated with a small portion of the growth and this animal quickly developed tuberculosis so that, when killed three months after it was found to be very extensively diseased. From this guinea-pig two calves were inoculated and both of these also developed tuberculosis, one becoming particularly badly affected. Thus the disease was conveyed, first from the pig to the human being, then from the human being to the guinea-pig, and lastly from the guinea-pig to the calf.

WEATHER IN SEPTEMBER.

If there is any truth in theories regarding weather, then according to one theory, farmers should be in for good seasons for the next twelve months. The theory is, that a wet September means a dry time for the next twelve months or more. Last September was a dry month in Southern Queensland, and, therefore, according to the propounder of the theory, there should be good rains during the succeeding twelve months. There certainly appears to be some good foundation for these assertions.

In September and October, 1906, splendid showers fell all over the district. In fact, the rainfall in September was unprecedented. The wiseacres shook their heads; with past experiences to guide them, they said there was sure to be a dry year. Apparently, there seems to be something in this theory —that a wet September means a drought. In September of 1883 there was good rain, and the big drought of 1884 and 1885 followed. In September, 1904, there was also good rain, and 1905 was a bad year, worse for a great number of people than 1900 or 1902. Then in September, 1906, there was heavy rain, and this was followed by many months of drought. Again, in September, 1898, there was a heavy shower in Longreach. This was the first rain that had fallen since March of that year, and in 1899 commenced the worst drought ever experienced in Queensland. Judging from these facts, it is evidently not a good thing to get rain in September, at least, not as far as the Mitchell district is concerned.

EX-STUDENTS OF THE QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

The acting hon. secretary of the Queensland Agricultural College Ex-Students' Club, writes as follows concerning the doings of some of the members:—

It is highly gratifying to know that a large percentage of those who have passed through the College are now settled on the land, and, as will be seen from the following notes, that they are all in a fair way to succeed as farmers and graziers.

As most of the ex-students of the Queensland Agricultural College are now consistent readers of your journal, they will no doubt be interested to learn something of their fellow students' progress, &c., in different parts of the State. We receive encouraging letters every now and then, relating the experiences of starting on life's work for themselves.

Sid. Reddan writes from Kingaroy, where he has secured a scrub farm of 160 acres. He has 50 acres felled, 25 acres under maize last season. He is in a good district, and should be successful.

Jack Markwell, who only left the College last term, writes from Cooroy, N.C. line, where he has already acquired a farm, and is engaged in the erection of permanent improvements, as house, cow and horse stables, yards, &c. He intends to give his attention to mixed farming, and has the nucleus of his dairy herd. He has some sixty head of stock on his farm.

Two of the pioneer students recently visited the College—viz., P. M. Bailey and F. E. Walker. P. Bailey has now been managing the Pittsworth Co-operative Dairying Company for the past ten years with no small measure of success. The business of the company has grown beyond expectations under his management, and he enjoys the confidence of his board of directors and suppliers. He has also acquired a valuable block of Yandilla—some 750 acres—where he intends to establish a model farm. A good start in this direction has already been made.

F. E. Walker was fortunate in securing some 280 acres at Woolooga, N.C. line, and is milking a nice herd of dairy cows. He has, himself, erected a house of no mean order, and has carried out the initial work on a new farm with credit to his College and himself.

Two other students just starting for themselves are S. and G. Briggs. They selected the Gayndah district as offering the best advantages to them, and have started mixed farming there. There is now quite a nest of ex-students in that locality, and all seem to be doing more than "making ends meet."

Mr. J. Purcell also visited the College last month. He is now well established on what is recognised to be one of the best farms in the far-famed Atherton district. Dairying on a large scale occupies Mr. Purcell's attention. He is milking a very fine herd of the true type of dairy cow. Importations from the South have been frequently made of good blood from reputable herds.

Mr. W. Fiffett, one of the early students, is now in partnership with P. M. Bailey on his Yandilla property. He sold out his fruit farm at Nambour lately at a satisfactory price.

Leslie Uhr writes from his cattle station in Western Australia. Five years ago he started on this station with 1,000 head of mixed cattle, and now has a fine herd on a well-improved property. He has a run of 700 square miles of country.

Mr. J. G. Mallum writes from the Bellengen River, New South Wales, where he is working a farm on the share system. He describes the farm as containing 175 acres of excellent scrub soil from which he has every prospect of making sufficient to set him up on a place of his own.

E. H. Wall writes from his farm at Stapylton to say that he has now passed the unpaying stage on his place. He has been working hard making necessary improvements, and ringing 200 acres. He is inoculating all his cattle against redwater this year

J. L. Redmond writes from his lately acquired farm at Murray's Creek. He is making a beginning here, and has every hope of making a success of the venture. He intends dairying with the best stock available, and is on the lookout for good dairy stock.

R. Pearson, who only left the College last term, is working on his father's farm at Brooklands, Halifax. Sugar growing engages their attention.

T. F. Bowler is busy subduing the forest and scrub on his selection at Degilbo. As on all new places work stares you in the face on every side, and one has to keep going to get a farm in working order.

Mr. C. Rege informs me that he has started farming on his own account at Bowen. He intends to go in for market gardening more than anything else, a branch of farming for which the district of Bowen is noted. Early crops are successfully grown there, and catch the Southern markets when prices are good.

Messrs. W. Moran and T. Philipson, two students who finished their course at the College last term, write to say they are launching out for themselves, sugar growing on the Burdekin.

All these ex-students inherit the true British colonising spirit, and with their big hearts and strong hands are glad to accept their glorious heritage in the Queen State, and are going to prove an asset to it of which the Gatton College might well feel proud.

Times of Sunrise and Sunset at Brisbane, 1909.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·58	6·5	4·46	6·28
2	6·2	5·34	5·28	5·48	4·58	6 6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·35	5·26	5·49	4·56	6·7	4·46	6·30
5	5·59	5·35	5·25	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·24	5·49	4·55	6·9	4·46	6·32
7	5·57	5·36	5·22	5·50	4·54	6·9	4·46	6·32
8	5·55	5·37	5·21	5·50	4·54	6·10	4·46	6·33
9	5·54	5·37	5·20	5·51	4·53	6·11	4·46	6·34
10	·53	5·38	5·19	5·52	4·52	6·12	4·46	6·34
11	5·52	5·38	5·18	5·52	4·52	6·12	4·46	6·35
12	5·51	5·39	5·17	5·53	4·51	6·13	4·47	6·36
13	5·50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·50	6·15	4·47	6·37
15	5·47	5·40	5·14	5·55	4·50	6·15	4·47	6·38
16	5·46	5·40	5·13	5·55	4·49	6·16	4·47	6·38
17	5·45	5·41	5·12	5·56	4·49	6·17	4·48	6·39
18	5·44	5·41	5·11	5·56	4·49	6·18	4·48	6·39
19	5·43	5·42	5·10	5·57	4·48	6·18	4·48	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·49	6·41
21	5·41	5·43	5·8	5·58	4·47	6 20	4·49	6·41
22	5·39	5·43	5·7	5·59	4·47	6·21	4·50	6·42
23	5·38	5·43	5·6	5·59	4·47	6·22	4·51	6·42
24	5·37	5·44	5·5	6·0	4·46	6·23	4·51	6·43
25	5·36	5·44	5·4	6·0	4·46	6·23	4·52	6·43
26	5·35	5·45	5·3	6·1	4·46	6·24	4·52	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·26	4·54	6·44
29	5·31	5·46	5·1	6·3	4·46	6·26	4·54	6·45
30	5·30	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

Phases of th Moon.

			H.	M.
7 Sept.	☽	Last Quarter	5	44 a.m.
15 ,,	●	New Moon	1	9 ,,
23 ,,	☾	First Quarter	4	31 ,,
29 ,,	○	Full Moon	11	5 p.m.
6 Oct.	☽	Last Quarter	4	44 p.m.
14 ,,	●	New Moon	6	13 ,,
22 ,,	☾	First Quarter	5	4 ,,
29 ,,	○	Full Moon	8	7 a.m.
5 Nov.	☽	Last Quarter	7	38 a.m.
13 ,,	●	New Moon	0	18 p.m.
21 ,,	☾	First Quarter	3	29 a.m.
27 ,,	○	Full Moon	6	52 p.m.
5 Dec.	☽	Last Quarter	2	12 a.m.
13 ,,	●	New Moon	5	59 ,,
20 ,,	☾	First Quarter	0	18 p.m.
27 ,,	○	Full Moon	7	30 a.m.

Answers to Correspondents.

PIT SILO.

C. J. Gwyther, Mount Beppo—

1.—The cubic content of a silo to hold, say, 100 tons of silage, should be 4,091 cub. ft.

2.—A round silo is preferable to a square one, as there are no corners to tighten. The silo to hold 100 tons, should be 30 ft. deep by 15 ft. in diameter. Such a silo will contain feed for thirty cows for 180 days, assuming 40 lb. of silage to be fed to each cow daily.

3.—1 cub. ft. of silage will average about 45 lb. in weight, and every 50 cub. ft. of the volume of the silo will hold 1 ton. One ton of green maize or lucerne will make 1 ton of silage.

4.—The walls and bottom of a pit silo should be air-tight. If the earth is solid, make the sides perfectly smooth. If not solid and gravel and sand are available, it is better to concrete the sides than to use slabs. There is no need for a drain at the bottom, as a drain which would carry off water would let in air, to the great detriment of the silage. The concrete should be made smooth. Pit silos are not now recommended on account of the loss occurring owing to excessive and faulty fermentation. The addition of water when filling the silo, will to some extent rectify this.

NATIVE GRASSES, SCRUB FELLING, Etc.

G. A. R., Kilcoy—

1.—We understand that the grasses were collected by Mr. George Wilkinson, Lion Creek road, Rockhampton; others by Mr. C. Ross, manager of the State Farm at Westbrook.

2.—The best time to fell scrub. This is hard to say. If the sap were up in all the trees at the same time, then that would be the proper time, but trees differ greatly in this respect.

3.—The scrub should be felled so that the trees lie as nearly as possible in the same direction without falling across each other. The limbs should be well lopped so as to let the whole lie flat. The length of time the scrub should lie before burning depends on the season, whether it is very wet or dry. About six weeks is a fair thing. The burning off should take place before the leaves have fallen, to ensure a good burn.

4.—*Paspalum dilatatum.* *Phalaris commutata* (Canary Grass) and Rhodes Grass.

5.—The mixture of Paspalum and Prairie Grass is not advisable.

6.—Canary Grass may be obtained from the Hermitage State Farm, Warwick, and at the State Farm, Westbrook. Paspalum, Rhodes Grass, and Wonder Grass at the Queensland Agricultural College, Gatton.

7.—You might sow grass seed when the corn is 4 ft. high, but do not sow both together, as the young corn must be kept clean.

8.—Apply to the College and to the Hermitage. Seed of 90-day corn may be available. If so, the price would probably be about 7s. per bushel.

WHITE WORMS IN HORSES.

Ploughman, Degilbo—

After the horse has fasted some twelve hours, Mr. Cory, V.S., recommends that the animal be drenched with 2 oz. of turpentine mixed in 1 pint of raw linseed oil. Thoroughly mix, and drench very slowly and carefully to prevent the mixture getting into the windpipe. Then the following powder can be given daily in its food for a week or two:—.

Sulphate of iron, 2 drachms; tartar emetic, 1 drachm; powdered aniseed, 1 oz. (To make one powder.)

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	SEPTEMBER. Prices.
Apples (Hobart), per case ...	9s. to 10s.
Apples (Victorian), per case	10s to 12s. 6d.
Apples (American), per case	15s.
Apples (Cooking), per case	8s. to 9s.
Bananas (Cavendish), per dozen ...	3½d. to 5d.
Bananas (Sugar), per dozen	2½d. to 3d.
Cape Gooseberries, per quarter-case	5s. 6d. to 7s. 6d.
Custard Apples, per quarter-case	5s. to 6s.
Lemons (Lisbon), per case	5s. 6d. to 7s.
Lemons (Sydney), per case	...
Mandarins, per quarter-case	5s. to 10s.
Mangoes, per case ...	3s. 6d. to 7s.
Oranges, per case ...	4s. to 6s. 9d.
Oranges (Local), per case	...
Papaw Apples, per quarter-case ...	1s. 3d. to 2s.
Passion Fruit, per quarter-case ...	5s. to 6s.
Pears, per case ...	...
Pears (Hobart), per case ...	...
Pears (Victorian), per case	...
Persimmons, per box	...
Pineapples (Ripley Queen), per dozen ...	4s. to 4s. 6d.
Pineapples (Rough), per dozen	1s. 6d. to 3s. 1d.
Pineapples (Queen), per dozen	2s. 6d. to 6s.
Rosellas, per sugar bag	...
Strawberries, per tray	1s. to 1s. 6d.
Tomatoes, per quarter-case	2s. 6d. to 4s.

SOUTHERN FRUIT MARKET.

Article.	Prices.
Apples (Local), per gin case	9s. to 10s.
Apples (Tasmanian), per bushel case	7s. to 12s.
Apples (Eating), per case ...	...
Apples (Cooking), per bushel case	6s. to 9s.
Bananas (Fiji, G.M.), per case ...	19s.
Bananas (Fiji, G.M.), per bunch...	5s. to 12s.
Bananas (Queensland), per dozen	nominal.
Cocoanuts, per dozen	2s. to 2s. 6d.
Lemons (Local), per gin case	3s. to 8s.
Lemons (Italian), per half-case ...	...
Mandarins (Emperor), per gin case	9s. to 14s.
Mandarins (Medium), per gin case	...
Oranges (Local), per gin case	5s. to 9s.
Oranges (Navel), per case...	...
Passion Fruit, per half-case	6s. to 7s.
Peanuts, per lb.	...
Pears (Victorian, Josephine), Choice, per packer	12s. to 15s.
Pears (Medium), Choice, per packer	10s. to 11s.
Persimmons, per box	...
Pineapples (Queensland), Ripley Queen, per case	s. 6d. to 8s. 6d.
Pineapples (Queensland), Choice, Common, per case ...	6s. 6d. to s.
Pineapples (Queensland), Choice, Queen, per case	6s. 6d. to 7s. 6d.
Quinces, per gin case	...
Strawberries (Queensland), per 3-quart tray	5s. to 6s.
Tomatoes (Queensland), per quarter-case	3s. 6d. to s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR OCTOBER.

Article.		OCTOBER. Prices.
Bacon, Pineapple	lb.	6½d. to 9½d.
Barley, Malting	,,	3s. 6d. to 3s. 9d.
Bran	ton	£5 5s.
Butter, Factory	cw.	104s.
Chaff, Mixed	ton	£4 to £4 10s.
Chaff, Oaten	,,	£4 10s. to £4 11s. 6d.
Chaff, Lucerne	,,	£5 to £6.
Chaff, Wheaten (Straw)	,,	£2 to £2 10s.
Cheese	lb.	5¼d. to 1s.
Flour	ton	...
Hay, Oaten	,,	£5 5s. to £5 10s.
Hay, Lucerne	,,	£2 to £4.
Honey	lb.	2d. to 2½d.
Maize	bush.	4s.
Oats	,,	3s. 3d. to 3s. 4d.
Pollard	ton	£5 15s.
Potatoes	,,	£4 to £10 5s.
Potatoes, Sweet	,,	£3 to £4.
Pumpkins	,,	£1 10s. to £4.
Wheat, Milling	bush.	5s. to 5s. 3d.
Wheat, Chick	,,	...
Onions	ton	£5 to £11 5s.
Hams	lb.	1s. to 1s. 1½d.
Eggs	doz.	7d. to 8½d.
Fowls	pair	3s. 6d. to 5s. 6d.
Geese	,,	5s. 9d. to 6s. 9d.
Ducks, English	,,	4s. to 4s. 9d.
Ducks, Muscovy	,,	4s. 9d. to 5s. 9d.
Turkeys (Hens)	,,	5s. 9d. to 6s. 9d.
Turkeys (Gobblers)	,,	12s. to 16s. 9d.

ENOGGERA SALEYARDS.

Animal.	SEPTEMBER. Prices.
Bullocks	£8 2s. 6d. to £10 5s.
,, (single)	£13 12s. 6d.
Cows	£6 5s. to £8 5s.
Merino Wethers	18s. 6d.
Crossbred Wethers	21s. 6d.
Merino Ewes	13s. 9d.
Crossbred Ewes	18s. 3d.
Lambs	12s. 9d.
,, Extra prime	16s. 6d.
Pigs	39s.

Orchard Notes for December.

By ALBERT H. BENSON, M.R.A.C.

The Southern Coast Districts.

December is somewhat of an off month for pines, though bananas should be improving both in quality and quantity. The purely tropical summer ripening fruits are not yet ready, and, consequently, there is only a limited supply of fruit in this part of Queensland during the month.

Early ripening varieties of grapes will mature, and care should be taken to market them in good order. The first fruit to ripen should be put up in small packages, as, if marketed in this manner, it will fetch a better price, but as it becomes more plentiful it can be packed in larger cases.

Pay particular attention during the month to all peaches, apples, pears, Japanese plums, or other fruits that are liable to be attacked by fruit fly, and see that no fly-infested fruits are allowed to lie about under the trees, and thus breed out a great crop of flies that will be ready to destroy the grape and mango crops as they mature.

If the month is dry see that the orchard is kept well worked so as to retain moisture in the soil, and, in any case, even should there be a good rainfall, it is necessary to cultivate in order to keep down weed growth, as if weeds are not kept in check now there is little chance of their being kept in hand once the January and February rains set in.

The planting out of pineapples, bananas, and most kinds of tropical fruits can be carried out during the month, especially if there is any rainy weather; but, if the weather is dry, it is better to defer the planting of tropical fruits till January or February.

The cyaniding of citrus trees can be continued when necessary, and where Maori or orange mite is showing it should be checked at once, as Maori fruit is of no use for the Southern markets, and is unsuitable for export to the old country.

The Tropical Fruit Districts.

Clean up all orchards, pineapple, and banana plantations as long as you have the chance of fine weather, so as to have your land in good order when the wet season commences, as once the rain sets in there is little chance of fighting weeds. Watch bananas carefully for fly, and market the fruit in good order. Handle the crop of pines carefully; don't let the fruit get too ripe, as an over-ripe northern pine is tasteless. The fruit should be cut as soon as it is fully grown, as even when quite green the rough-leafed varieties have usually developed sufficient sugar to suit most persons' taste. Pack carefully to prevent bruising, and they will carry South in good order.

Only send high-class mangoes South—bad flavoured sorts, and stringy, carroty, or turpentine flavoured varieties are not worth shipping. High-class fruit will pay to handle carefully, but there is no demand for rubbish, and I am sorry to say that fully 90 per cent. of the mangoes grown in the State must be classed under the latter heading.

Tropical fruits of all kinds can be set out during suitable weather. Fruit pests of all sorts must be systematically fought.

The Southern and Central Tablelands.

December is a busy month for the growers in the Stanthorpe district. Early apples, plums, peaches, nectarines, &c., will ripen during the month, and must be marketed as soon as ripe, as they do not keep long once they are gathered. Handle carefully, and grade better; there is far too much early rubbish slumped on to the local markets, which tends to spoil the demand as well as the price. Watch the orchards very carefully for Codling moth and fruit fly, and take every possible precaution to keep these pests in check should they make their appearance, as the future cleanliness of the orchard depends very largely on the care that is taken now to keep these pests in check.

If the month is dry keep the orchard and vineyard well cultivated. Watch the vines carefully so as to detect the first sign of Oidium or Anthracnose, and systematically fight these pests, remembering always that in their case prevention is better than cure, and that only prompt action is of the slightest value.

On the Darling Downs every care must be taken to keep the fruit fly in check, and on no account must infested fruit be allowed to lie about under the trees, as this is far and away the best method of propagating the pest wholesale.

In the Central District the grape crop will ripen during the month. Handle the fruit carefully. Cut it when dry, and where it has to be sent long distances to market pack in 6-lb. baskets rather than in larger cases. Where dry keep the orchard and vineyard well cultivated, and where the citrus and other fruit trees require it give them an irrigation. Don't irrigate grapes once the seeds have been formed, as it tends to deteriorate the quality, and to make the fruit tender and consequently to carry badly.

Farm and Garden Notes for December.

FIELD.—The grain harvest will now be nearing completion, and to all appearance the results are likely to constitute a record, and the yield promises to be very satisfactory to the wheat-growers. The principal factor operating against a still greater extension of the wheat-growing industry is, that many farmers who formerly grew wheat and barley have turned their attention to dairying, which offers larger and quicker returns.

The dry weather which prevailed during the months of August and September gave rise to grave fears for the harvest, but the subsequent timely rainfall came just in time to save the crop. The estimates of the probable yield have varied so considerably that it will be well to wait until the harvest is over before calculating on the result.

Given favourable weather, maize, panicum, imphee, Kafir corn, and sorghum may be sown. Arrowroot, ginger, and sweet potatoes may be sown.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may still be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Take up onions, and spread them out thinly on the barn floor until the tops wither sufficiently to pull off easily. They should then be graded into sizes, and sent to market or stored in a cool place. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface, beneath the loose soil. Alternate light, with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulacca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top dress all lawns.

The Man who Works with his Hands.

[CONCLUSION.]

EDUCATIONAL AND RESEARCH WORK OF THE DEPARTMENT OF AGRICULTURE.

The corner stones of our unexampled prosperity are, on the one hand, *the production of raw material,* and *its manufacture and distribution* on the other. These two great groups of subjects are represented in the National Government principally by the Departments of Agriculture and of Commerce and Labour. The production of raw material from the surface of the earth is the sphere in which the Department of Agriculture has hitherto achieved such notable results. *Of all the Executive Departments there is no other, not even the Post Office, which comes into more direct and beneficent contact with the daily life of the people than the Department of Agriculture, and none whose yield of practical benefits is greater in proportion to the public money expended.*

But great as its services have been in the past, the Department of Agriculture has a still larger field of usefulness ahead. It has been dealing with growing crops. It must hereafter deal also with living men. *Hitherto agricultural research, instruction, and agitation have been directed almost exclusively toward the production of wealth from the soil.* It is time to adopt in addition a new point of view. *Hereafter another great task before the National Department of Agriculture and the similar agencies of the various States must be to foster agriculture for its social results, or, in other words, to assist in bringing about the best kind of life on the farm for the sake of producing the best kind of men.* The Government must recognise the far-reaching importance of the study and treatment of the problems of farm life alike from the social and the economic standpoints; and the Federal and State Departments of Agriculture should co-operate at every point.

The farm grows the raw material for the food and clothing of all our citizens; it supports directly almost half of them; and nearly half the children of the United States are born and brought up on farms. How can the life of the farm family be made less solitary, fuller of opportunity, freer from drudgery, more comfortable, happier, and more attractive? Such a result is most earnestly to be desired. *How can life on the farm be kept on the highest level, and where it is not already on that level, be so improved, dignified, and brightened as to awaken and keep alive the pride and loyalty of the farmer's boys and girls, of the farmer's wife, and of the farmer himself? How can a compelling desire to live on the farm be aroused in the children that are born on the farm?* All these questions are of vital importance not only to the farmer but to the whole nation; and the Department of Agriculture must do its share in answering them.

The drift toward the city is largely determined by the superior social opportunities to be enjoyed there, by the greater vividness and movement of city life. Considered from the point of view of national efficiency, the problem of the farm is as much a problem of attractiveness as it is a problem of prosperity. It has ceased to be merely a problem of growing wheat and corn and cattle. The problem of production has not ceased to be fundamental, but it is no longer final; just as learning to read and write

and cipher are fundamental, but are no longer the final ends of education. We hope ultimately to double the average yield of wheat and corn per acre; it will be a great achievement; but it is even more important to double the desirability, comfort, and standing of the farmer's life.

We must consider, then, not merely how to produce, but also how production affects the producer. In the past we have given but scant attention to the social side of farm life. We should study much more closely than has yet been done the social organisation of the country, and inquire whether its institutions are now really as useful to the farmer as they should be, or whether they should not be given a new direction and a new impulse, for no farmer's life should lie merely within the boundary of his farm. This study must be of the East and the West, the North and the South; for the needs vary from place to place.

First in importance, of course, comes the effort to secure the mastery of production. Great strides toward this end have already been taken over the larger part of the United States; much remains to be done, but much has been done; and the debt of the nation to the various agencies of agricultural improvement for so great an advance is not to be over-stated. But we can not halt here. The benefits of high social organisation include such advantages as ease of communication, beter educational facilities, increased comfort of living, and those opportunities for social and intellectual life and intercourse, of special value to the young people and to women, which are as yet chiefly to be had in centres of population. All this must be brought within the reach of the farmers who live on the farms, of the men whose labour feeds and clothes the towns and cities.

BENEFITS RESULTING FROM CO-OPERATION.

Farmers must learn the vital need of co-operation with one another. Next to this comes co-operation with the Government, and the Government can best give its aid through associations of farmers rather than through the individual farmer; for there is no greater agricultural problem than that of delivering to the farmer the large body of agricultural knowledge which has been accumulated by the National and State Governments and by the agricultural colleges and schools. Nowhere has the Government worked to better advantage than in the South, where the work done by the Department of Agriculture in connection with the cotton-growers of the South-western States has been phenomenal in its value. The farmers in the region affected by the boll weevil, in the course of the efforts to fight it, have succeeded in developing a most scientific husbandry, so that in many places the boll weevil became a blessing in disguise. Not only did the industry of farming become of very much greater economic value in its direct results, but it became immensely more interesting to thousands of families. The meetings at which the new subjects of interest were discussed grew to have a distinct social value, while with the farmers were joined the merchants and bankers of the neighbourhood. It is needless to say that every such successful effort to organise the farmer gives a great stimulus to the admirable educational work which is being done in the Southern States, as elsewhere, to prepare young people for an agricultural life. It is greatly to be wished that the communities whence these students are drawn and to which they either return or should return could be co-operatively organised; that is, that associations of farmers could be organised, primarily for business purposes, but also with social ends in view. This would mean that the returned students from the institutions of technical learning would find their environment prepared to profit to the utmost by the improvements in technical methods which they had learned.

The people of our farming regions must be able to combine among themselves, as the most efficient means of protecting their industry from the highly organised interests which now surround them on every side. A vast field is open for work by co-operative associations of farmers in dealing with the relation of the farm to transportation and to the distribution and manufacture of raw materials. It is only through such combination that American farmers can develop to the full their economic and social power. Combination of this kind has, in Denmark, for instance, resulted in bringing the people back to the land, and has enabled the Danish peasant to compete in extraordinary fashion, not only at home but in foreign countries, with all rivals.

Kind of Education Needed.

Agricultural colleges and farmers' institutes have done much in instruction and inspiration; they have stood for the nobility of labour and the necessity of keeping the muscles and the brain in training for industry. They have developed technical departments of high practical value. They seek to provide for the people on the farms an equipment so broad and thorough as to fit them for the highest requirements of our citizenship; so that they can establish and maintain country homes of the best type, and create and sustain a country civilisation more than equal to that of the city. The men they train must be able to meet the strongest business competition, at home or abroad, and they can do this only if they are trained not alone in the various lines of husbandry but in successful economic management. These colleges, like the State experiment stations, should carefully study and make known the needs of each section, and should try to provide remedies for what is wrong.

The education to be obtained in these colleges should create as intimate relationship as is possible between the theory of learning and the facts of actual life. Educational establishments should produce highly trained scholars, of course; but in a country like ours, where the educational establishments are so numerous, it is folly to think that their main purpose is to produce these highly trained scholars. Without in the least disparaging scholarship and learning—on the contrary, while giving hearty and ungrudging admiration and support to the comparatively few whose primary work should be creative scholarship—*it must be remembered that the ordinary graduate of our colleges should be and must be, primarily, a man and not a scholar. Education should not confine itself to books. It must train executive power, and try to create that right public opinion which is the most potent factor in the proper solution of all political and social questions.* Book-learning is very important, but it is by no means everything; and *we shall never get the right idea of education until we definitely understand that a man may be well trained in book-learning and yet, in the proper sense of the word and for all practical purposes, be utterly uneducated; while a man of comparatively little book-learning may, nevertheless, in essentials have a good education.*

Improvement of Conditions Affecting Country Life.

It is true that agriculture in the United States has reached a very high level of prosperity; but we cannot afford to disregard the signs which teach us that there are influences operating against the establishment or retention of our country life upon a really sound basis. The over-extensive and wasteful cultivation of pioneer days must stop and give place to a more economical system. Not only the physical but the ethical needs of the people of the country districts must be considered. In our country

life there must be social and intellectual advantages as well as a fair standard of physical comfort. *There must be in the country, as in the town, a multiplication of movements for intellectual advancement and social betterment. We must try to raise the average of farm life, and we must also try to develop it so that it shall offer exceptional chances for the exceptional man.*

Of course the essential things after all are those which concern all of us as men and women, no matter whether we live in the town or the country, and no matter what our occupations may be. The root problems are much the same for all of us, widely though they may differ in outward manifestation. The most important conditions that tell for happiness within the home are the same for the town and the country; and the relations between employer and employee are not always satisfactory on the farm any more than in the factory. All over the country there is a constant complaint of paucity of farm labour. Without attempting to go into all the features of this question I would like to point out that you can never get the right kind, the best kind, of labour if you offer employment only for a few months, for no man worth anything will permanently accept a system which leaves him in idleness for half the year.

A WORD REGARDING THE FARMER'S FAMILY.

And most important of all, I want to say a special word on behalf of the one who is too often the very hardest worked labourer on the farm—the farmer's wife. Reform, like charity, while it should not end at home, should certainly begin there; and the man whether he lives on a farm or in a town, who is anxious to see better social and economic conditions prevail through the country at large, should be exceedingly careful that they prevail first as regards his own womankind. I emphatically believe that for the great majority of women the really indispensable industry in which they should engage is in the industry of the home. *There are exceptions, of course; but exactly as the first duty of the normal man is the duty of being the home-maker, so the first duty of the normal woman is to be the home-keeper; and exactly as no other learning is as important for the average man as the learning which will teach him how to make his livelihood, so no other learning is as important for the average woman as the learning which will make her a good housewife and mother.* But this does not mean that she should be an overworked drudge. I have hearty sympathy with the movement to better the condition of the average tiller of the soil, of the average wageworker, and I have an even heartier sympathy and applause for the movement which is to better the condition of their respective wives. There is plenty that is hard and rough and disagreeable in the necessary work of actual life; and under the best circumstances, and no matter how tender and considerate the husband, the wife will have at least her full share of work and worry and anxiety; but if the man is worth his salt he will try to take as much as possible of the burden off the shoulders of his helpmate. There is nothing Utopian in the movement; all that is necessary is to strive toward raising the average, both of men and women, to the level on which the highest type of family now stands, among American farmers, among American skilled mechanics, among American citizens generally; for *in all the world there is no better and healthier home life, no finer factory of individual character, nothing more representative of what is best and most characteristic in American life than that which exists in the higher type of American family; and this higher type of family is to be found everywhere among us, and is the property of no special group of citizens.*

The best crop is the crop of children; the best products of the farm are the men and women raised thereon; and the most instructive and practical treatises on farming, necessary though they be, are no more necessary than the books which teach us our duty to our neighbour, and above all to the neighbour who is of our own household. You young men and women of the agricultural and industrial colleges and schools—and, for that matter, you who go to any college or school—must have some time for light reading; and there is some light reading quite as useful as heavy reading, provided, of course, that you do not read in a spirit of mere vacuity. Aside from the great classics, and thinking only of the many healthy and stimulating books of the day, it is easy to pick out many which can really serve as tracts, because they possess what many avowed tracts and treatises do not, the prime quality of being interesting. You will learn the root principles of self-help and helpfulness toward others from "Mrs. Wiggs of the Cabbage Patch" just as much as from any formal treatise on charity; you will learn as much sound social and industrial doctrine from Octave Thanet's stories of farmers and wage-workers as from avowed sociological and economic studies; and I cordially recommend the first chapter of "Aunt Jane of Kentucky" for use as a tract in all families where the men folks tend to selfish or thoughtless or overbearing disregard of the rights of their womenkind.

Do not misunderstand me. I have not the slightest sympathy with those hysterical and foolish creatures who wish women to attain to easy lives by shirking their duties. I have as hearty a contempt for the woman who shirks her duty of bearing and rearing of children, of doing her full housewife's work, as I have for the man who is an idler, who shirks his duty of earning a living for himself and for his household, or who is selfish or brutal toward his wife and children. *I believe in the happiness that comes from the performance of duty, not from the avoidance of duty.* But I believe also in trying, each of us, as strength is given us, to bear one another's burdens; and this especially in our own homes. *No outside training, no co-operation, no Government aid or direction can take the place of a strong and upright character; of goodness of heart combined with clearness of head, and that strength and toughness of fibre necessary to wring success from a rough work-a-day world. Nothing outside of home can take the place of home. The school is an invaluable adjunct to the home, but it is a wretched substitute for it.* The family relation is the most fundamental, the most important of all relations. *No leader in church or state, in science or art or industry, however great his achievement, does work which compares in importance with that of the father and the mother, "who are the first of sovereigns and the most divine of priests."*

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF OCTOBER, 1909.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Cocoa ...	Jersey	12 Sept., 1909	1,083	4·0	48·40	
Peewee ...	Holstein-Shorth'n	29 Aug. ,,	1,162	3·7	47·83	
Whitefoot ...	Holstein-Devon ...	1 Oct. ,,	1,009	3·7	41·54	
Careless ...	Jersey	27 Sept. ,,	878	4·2	41·30	
Rhoda ...	Ayrshire-Shorth'n	4 Aug. ,,	924	3·7	38·01	
Lass ...	Ayrshire	13 June ,,	799	4·2	37·59	
Lark ...	,, ...	14 Aug. ,,	935	3·6	37·40	
Hettie ...	Grade Ayrshire ...	17 Sept. ,,	900	3·7	37·05	
Honeycombe	Shorthorn ...	11 April ,,	706	4·1	36·50	
Lady Kelso	,, ...	2 Oct. ,,	912	3·6	36·48	
Remit ...	Holstein	4 Aug. ,,	851	3·7	35·03	
Redrose ...	Shorthorn... ...	21 Sept. ,,	851	3·6	34·04	First calf
Lubra ...	Grade Jersey ...	5 April ,,	592	5·0	33·42	
Chocolate ...	Shorthorn... ...	15 June ,,	807	3·7	33·22	
Auntie ...	Ayrshire	23 Aug. ,,	821	3·6	32·84	
Linda ...	,, ...	11 April ,,	731	4·0	32·70	
Burton's Lass	Shorthorn ...	14 Sept. ,,	789	3·7	32·48	First calf
Grace ...	,, ...	17 Aug. ,,	781	3·7	32·15	
Len ...	Ayrshire ...	3 Oct. ,,	799	3·5	31·00	
Night ...	Grade Holstein ...	23 Sept. ,,	793	3·5	30·77	
Ivy ...	Jersey	16 June ,,	644	4·2	30·29	
Tiny ...	,, ...	15 Sept. ,,	706	3·8	29·89	
Lady Ring...	Guernsey	26 Jan. ,,	522	5·0	29·80	
Reamie ...	Ayrshire	7 July ,,	740	3·6	29·60	

Grazed on cultivation paddocks part of the month, the balance on natural pasture.

WHY MILK DETERIORATES.

It seems to be very difficult for a great many dairymen to understand the importance of keeping milk clean—allowing no foreign substance like pieces of straw, dust, and even particles of manure to get into the milk. They will tell you that they strain it through two thicknesses of cheese-cloth and remove all these foreign substances, consequently the milk ought to be clean. The fact is, that straining the milk does not do as much good as they imagine. The hair, or the bit of straw, does not do so very much harm. It is the bacteria, or microscopic organisms, little microscopic plants, adhering to these foreign substances which really do the harm, and these bacteria cannot be removed by straining the milk. The only thing to do is to keep them out in the first place.

When milk is drawn from a cow's udder it is perfectly clean and wholesome; in other words, it is what is known as sterile milk. If it can be kept in that condition it does not spoil. Dr. Marshall, the bacteriologist of the Michigan Agricultural College, succeeded in keeping some milk from a cow absolutely clean and sealed up in a glass vessel. This milk keeps sweet. There is nothing to sour it. It is now about two years since it was drawn from the udder of the cow, and yet no change has taken place. Many people would not believe this if they did not know it.

Mr. Gurler, of Illinois, produced milk that was sent to the Paris Exposition a few years ago. Twenty-two days after that milk was drawn from the udder of the cow it was inspected in Paris and was found sweet and wholesome. This was made possible simply because the reason for the deterioration of milk was fully understood and proper precautions were observed in keeping the milk clean.

In every cowyard thousands and thousands of particles of dust are floating in the air. These particles of dust have bacteria adhering to them. If this dust settles into the milk pail the bacteria change from a dormant state to a very active one. Bacteria require food and moisture and a certain temperature in which to multiply and grow. Warm milk furnishes just the right conditions for their most rapid development. Again, the hairs from the cow and pieces of straw and hay in the stable are covered with these microscopic plants, and if we allow them to drop into the pail we introduce into the milk large numbers of bacteria at once.

Of course there are different kinds of bacteria. Some are harmful and some are not. One kind of bacteria turns the milk sugar to lactic acid or causes the milk to sour. These bacteria are not particularly detrimental. We can consume sour milk with no particular detriment to health, but the trouble is that we are liable to have other kinds of bacteria which are harmful in the milk as well as these lactic acid bacteria. In a filthy cowyard we are liable to get the bacteria which produce bowel complaint, or cholera morbus, a disease so prevalent in children. The manure from cows almost always contains this kind of bacteria, and if we are unclean enough to allow any of these bacteria to get into the milk it is absolutely dangerous to consume the milk.

When bacteria once get into the warm milk they multiply faster than very many of us have any idea. Some very interesting experiments have recently been made at Cornell University. First, a hair from a cow's flank was put into 500 cubic centimetres of milk. The milk was shaken for one minute, and upon examination it was found that there were 52 bacteria to the cubic centimetre.

In twenty-four hours the number of bacteria had increased to 55,000 per cubic centimetre. Again, a piece of hay from the stable floor, 2 in. long, was put into 500 cubic centimetres of milk. This milk was shaken for one minute, when it was found that it contained 3,025 bacteria per cubic centimetre; but, after twenty-four hours, upon examination, this milk was found to contain 3,412,000 bacteria per cubic centimetre. Now, as everyone knows, a cubic centimetre is an exceedingly small quantity of milk—only a few drops. The only way, then, to have good milk is to not allow very many of these bacteria to get into it. Of course, it is not practical to attempt to keep them all out. That could not be done in a dairy, but we want to keep the cows clean and keep the bails and yards reasonably clean, draw the milk in a cleanly manner, have the pails clean, and keep out just as many bacteria as possible.

Since bacteria multiply so rapidly, and since it is aboslutely impossible to keep them all out of milk, it is necessary, if we want to keep the milk for any length of time, to do something to prevent the bacteria from multiplying so rapidly. This can be done very easily. If bacteria multiply very rapidly in the milk the milk must be warm. If we cool the milk down to a temperature below 60 deg., bacteria multiply in it very slowly.

This is the reason why we ask the dairymen to cool down their night's milk or cream after each separation—simply get it so that these bacteria cannot multiply rapidly and destroy the milk or make it unwholesome. It does not do very much good to cool either milk or cream down and then let it warm up again in hot weather. Just as soon as the milk gets up to a certain temperature again the bacteria commence to grow. The thing to do is to

cool the milk down just as soon as possible after it is drawn from the udder of the cow, and then keep it cool until it is made into butter or cheese, or consumed direct as human food.

From the above anyone can readily understand why it is so necessary to wash dairy utensils clean. If a little milk is left in the seams of the can or milk pail, the milk contains bacteria, and they grow and develop at a wonderful rate. Now, when warm milk is put into this can, or pail, there are thousands and thousands of bacteria ready to grow and multiply, and there is no use trying to keep cows clean, and the yard clean, and then have dirty dairy utensils. It is cleanliness from start to finish if we want good milk, and, besides that, be as clean as we will, we shall still have some bacteria, so we must reduce that milk to a temperature in which they will develop slowly.—"Farm and Home."

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1908.			1909.									
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.
North.													
Bowen	2·47	0·42	0·42	15·48	4·52	1·06	1·15	2·32	1·98	1·23	0·13	0·21	0·36
Cairns	3·07	1·60	1·41	32·05	5·25	21·03	14·19	1·06	2·48	0 65	2·48	0·7	3·19
Geraldton	6·93	3·80	1·69	47·92	10·29	37·31	28·51	5·98	9·13	6·53	5·32	0·36	6·71
Gladie State Farm ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Herberton	1·27	0·61	0·78	12·41	2·28	3·52	0·70	0·81	1·22	0·20	0·75	0·50	2·30
Hughenden	1·67	1·94	1·05	7·55	1·55	2·86	...	Nil	1·71	1·37	0·33	0·8	1·95
Kamerunga State Nurs.	3·64	1·69	...	...	3·52	...	4·95	0·97	...	...	...	...	...
Mackay	1·80	2·57	0·02	15·00	1·36	9·00	2·59	2·33	2·05	4·00	0·75	0·73	2·88
Rockhampton	2·14	2·47	1·37	9·01	2·01	1·68	1·21	0·03	1·33	2·99	1·37	1·20	2·16
Townsville	1·58	1·26	0·07	6·94	1·70	7·01	1·28	1·07	1·51	0·83	0·57	0·12	2·07
South.													
Biggenden State Farm	1·80	2·12	3·66	7·37	2·68	2·45	2·00	0·72	2·60	4·01	1·78	0·29	...
Brisbane	1·77	2·25	1·28	1·99	2·72	2·65	4·67	0·82	1·75	2·10	2·44	2·74	1·56
Bundaberg	2·39	0·73	3·34	6·52	3·70	5·06	1·54	0·67	1·51	5·65	1·66	0·98	0·42
Dalby	2·55	3·65	1·56	1·46	3·55	0·99	1·60	Nil	1·87	1·19	3·13	0·47	1·92
Esk	1·29	5·99	3·62	2·64	3·21	3·27	5·03	0·36	2·43	2·74	3·31	2·60	2·61
Gatton Agric. College	1·93	5·71	1·29	1·94	5·00	3·18	3·82	0·32	1·22	2·02	2·09	2·29	1·87
Gympie	2·49	2·58	3·97	3·86	3·77	3·41	2·34	1·15	2·96	4·70	2·80	1·70	2·30
Ipswich	1·48	5·09	1·05	1·37	1·95	2·66	4·56	0·05	1·31	1·67	1·34	3·55	1·93
Maryborough	1·84	1·92	1·64	8·36	7·11	2·28	2·4	0·91	2·57	5·02	2·53	1·56	0·51
Roma	2·15	2·79	1·68	5·19	4·85	4·18	1·91	0·41	2·73	1·54	4·83	0·12	0·90
Roma State Farm ...	...	...	...	...	...	...	..	...	...	...	...	...	...
Tewantin	2·30	7·50	4·12	6·44	3·31	4·34	9·37	1·00	3·24	4·08	4·24	1·38	3·82
Warwick	0·96	5·28	2·02	0·87	0·82	1·30	2·21	0·70	1·23	2·04	2·28	1·77	2·85
Westbrook State Farm	...	2·05	...	...	2·61	1·43	...	...	...	...	...	...	...
Yandina	3·10	6·03	2·75	6·69	6·42	3·71	5·25	1·10	2·70	3·70	5·81	3·84	2·30

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

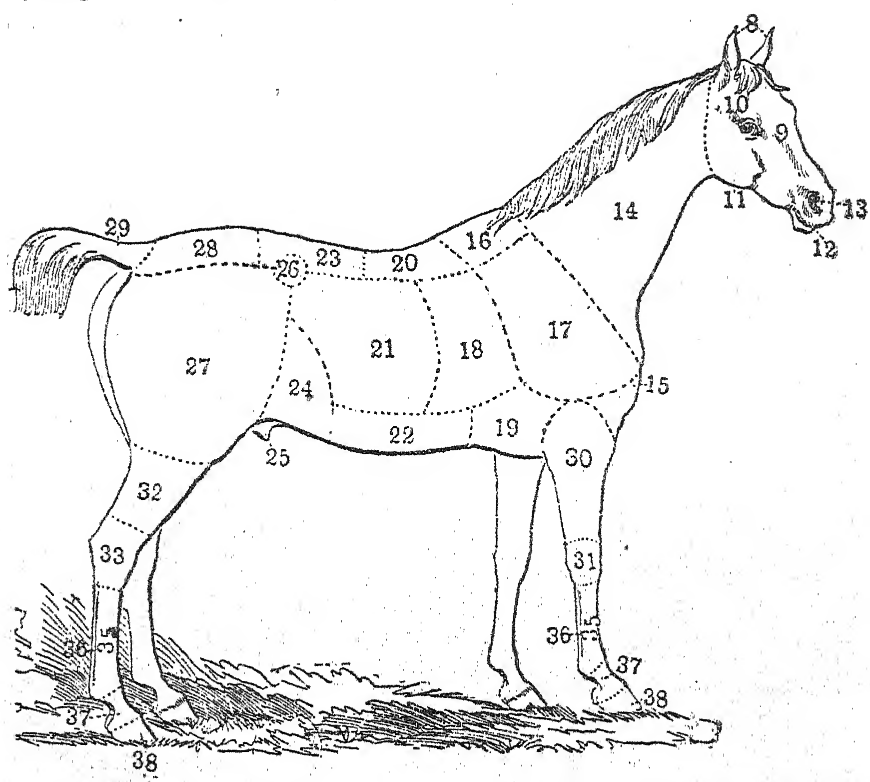
GEORGE G. BOND,
Divisional Officer.

The Horse.

POINTS OF A HACKNEY OR TROTTING HORSE.

P. R. GORDON.

I have selected for this paper the hackney, or trotting horse. The similarity between the two is so great that the value of the various points will answer both, with the exception that a somewhat heavier shoulder is permissible in a light harness horse that would not be tolerated in the hackney. As in the case of the Clydesdale, I have made use of the diagram which illustrated my old friend the late Mr. Alexander Bruce's paper on point judging. I have not, however, followed his mode of assessing the values of the different points, but have adhered to the decimal system, taking 100 as the aggregate number of points. If, however, any of your readers think that some of the minor points should be increased or diminished by fractions, it will be an easy matter to adopt 1,000 as the aggregate; but a high aggregate tends to complicate the working out of the system. As in my previous paper, I would remind readers that the numbers stated are more suggestive than arbitrary, a matter of even greater importance is to insure that no point shall be overlooked when selecting or judging stock. As in the last paper, the points, for greater convenience, are grouped. The first seven points cannot be shown by diagram, but they are of great importance to breeders.



The above plate represents a Hackney or Trotting Entire with the points approximately indicated upon the plate, the numbers appearing on it corresponding with those given below in describing the points, and setting out their relative values.

GROUP I. relates to pedigree, performances, and offspring.

1. "Pedigree."—In the light of the standing of the horse in the stud-book. 8 points.

2. "Performances" or "offspring."—According to records or successes in show rings. 8 points.

GROUP II.—General Character, Style, and Action.

3. "General Character."—That indescribable elegance of outline and form when not in action, which is seen at a glance, and which, when combined with style and carriage, indicates purity of blood and high breeding. 4 points.

4. "Style and Carriage."—The natural and unrestrained carriage of the head, neck, and tail, and the movement of the limbs as presented in a state of animation, which, with the preceding point, indicate high breeding. 4 points.

5. "Action."—This will embrace the action and use of the limbs at a walk and slow trot, in which the difference between a dragging motion and the quick, tappy lifting of the feet will be considered. The right use (bending) of the knee and hock is necessary. 4 points.

GROUP III.—Colour and Size.

6. "Colour."—According to public taste, the leading colours may be classed as—Bay, dark chestnut, brown, black, roan, grey. All white markings, beyond a star on the forehead and one or two white feet, are objectionable in Australian hackneys. 2 points.

7. "Size."—This will be determined by the class to which the horse belongs. The model park horse is the model farm horse, and he should be 16 hands high, weighing 1,200 lb.: the road and trotting horse not less than 15½, and other breeds according to their uses. 4 points.

GROUP IV.—The Head.

8. "Ear."—Active, thin, and generous in length. The action of the ear with the eye discloses character. 2 points.

9. "Face."—The head, as a whole, should be in proportion to the size of the horse. It should be broad between the eyes, with prominent brain development, clean and bony. 3 points.

10. "Eye and Expression."—This organ and the ear shows character; and not only the fulness of the eye, but its character must be well studied. It should be bright, mild, lively, and truthful. 3 points.

11. "The Jaws" should be wide apart to give ample room for the windpipe. 1 point.

12 and 13. "Lips and Nostril."—Lips should be neat and compressed, and not open or hanging, and the nostril wide, high, active, and delicate. 1 point.

GROUP V.—Forequarter.

14. "The Neck."—This point includes the setting-on of the head, the length and shape of the neck, the free development of the windpipe, especially at the throttle, and the junction of the neck with the shoulders and breast. It should be somewhat long and slightly arching. 4 points.

15. "The Breast" should be sufficiently full and deep to give ample room for the heart and lungs, but not so heavy as to interfere with speed. 2 points.

16. "The Withers" should be high, to give safe action, muscular and sloping evenly into the shoulder. 2 points.

17. "The Shoulder" should be strong and muscular, well laid back, and should rise with a clean and even slope towards the withers. 2 points.

18. "The Foreribs" should be round (hooped), deep, and full. There must be ample room for the heart to beat and the lungs to play. Deficient in this respect, his stock will lack vigour of constitution and staying powers. 2 points.

19. "Chest" should be deep and well developed, and should run evenly into the shoulder—not chest-tied. 2 points.

GROUP VI.—The Middle.

20. "The Back" should be comparatively straight and broad, and should run full, wide, and level into the loin. 2 points.

(NOTE.—A somewhat lengthy back is not a serious objection in a light harness horse.)

21. "Back Ribs" should spring roundly in an arch from the backbone, and run well towards the hindquarters—*i.e.*, well ribbed up—and the last ribs should be round and well let down. 3 points.

22. "The Belly" should be fairly let down, but not to be "pot-bellied," nor too much "tucked-up," and with sufficient room for food. 1 point.

23. "The Loin" should be full, long, level, and broad, extending along the back to give strength. 2 points.

24. "The Flank" should be clean, neat, and fairly developed. 1 point.

25. "The Sheath" should be well developed. 1 point.

GROUP VII.—The Hindquarters.

26. "The Hips."—The hip bones should be well apart, not protruding, but symmetrical. 1 point.

27. "The Quarter" should be broad and strong, the styfles well apart and wide, when viewed from behind, with well-turned buttocks. 3 points.

28. "The Croup" should be long and comparatively level, but with a proper elevation sloping towards the tail. 2 points.

(NOTE.—It has been stated, as a general rule, that racehorses with straight croups—such as was Fisherman's—are remarkable for their staying powers, whereas many racehorses that have been remarkable for speed have had decidedly drooping croups.)

29. "Tail and Set-on."—The tail should leave the croup and be carried gracefully at the proper height, with free, soft, but strong hair. 4 points.

GROUP VIII.—The Legs, &c.

30. "Forearm" should be muscular and well developed. 2 points.

31. "The Knee" should be comparatively large and strong and clean, with the different members clearly defined. 2 points.

32. "The Gaskin" or "Thigh" should be broad, well developed, and muscular. 2 points.

33. "The Hock" should be strong and clean, with its different members clearly articulated, and nearly straight to the ground. 2 points.

34. "The Legs" should be short, straight, well set, well forward (not heavy in the shoulder), and properly proportioned. 5 points.

35. "The Bone" should be comparatively stout, but flat, broad under the knee and hock—not "knee-tied." 2 points.

36. "The Muscle" should be clean, clear of the bone, well defined, and sinewy. 1 point.

37. "The Pasterns" should be rather stout and short, with well-developed muscles, and set straight and at the proper angle. 1 point.

38. "The Feet" should be fair sized, rather large, well shaped, neither too open nor too close at the heels—giving evidence of strength and freedom internal trouble—and they should be straight and fair, neither turned in nor turned out at the toes. 5 points.

RECAPITULATION.

Pedigree and performances of offspring	16	points
General character, style, and action	12	"
Colour and size	6	"
Head	10	"
Forequarter	14	"
Middle	10	"
Hindquarter	10	"
Legs	22	"
Total	100	"

THE INFLUENCE OF SOIL IN HORSE BREEDING.

There is no point which is of more vital importance to success in the breeding of horses than that the land on which they are bred and reared should be of a suitable character for the purpose. This, in fact, constitutes the chief fundamental requirement in horse breeding, as all experienced breeders will agree. As it does in the case of other kinds of live stock, the nature of the soil plays a great part in moulding the type of horses; their size, the development of their bone, and their general conformation are all very largely influenced by this factor. And not only does it have a bearing on their outward type, but their whole inward quality—their constitution, the quality or texture of the bone, the toughness or otherwise of their sinews, &c.—are also affected by it to a material extent.

A further point to be considered in this connection is that the requirements of horses as regards the nature of the soil vary according to their breed. A soil which is suitable for one class of horse may be less so or quite unsuitable for another class, and each breed can be bred to perfection only on land that is suited to its specific requirements. When the conditions of soil are not congenial to its particular nature, a breed cannot flourish, and sooner or later loses its type or actually degenerates. For this reason horse breeds do not bear being indiscriminately transplanted from one kind of soil to another. Yet the mistake is very commonly made of attempting to breed a particular class or breed of horses on land which is totally unsuited to its character. This invariably leads to disappointment and failure.

For instance, really heavy and massive Shire horses can be raised only on rich and fertile land of a heavy character where the grazing is of the best, as well as very abundant. Such horses cannot be bred on lightish soils, because the grazing on these lacks the elements which are necessary for the production of this type of horses. Transplanted on to light land, Shire stock quickly deteriorate in size and weight, and the true Shire horse type, with its massive proportions and powerful build, is gradually lost. Cart horses bred on this kind of soil are always on the small side and of a lightish stamp, being wholly lacking in powerfulness. Their weight and size, in fact, bear a direct and close relationship to the richness and fertility of the soil. The richer the latter is, the more does it promote the development of these characteristics. The heaviest and biggest Shire draught horses are bred in the low-lying, marshy and rich lands of the Fen country in Lincolnshire and Cambridgeshire, which kind of soil favours the production of extreme weight and a huge framework to a greater extent than any other kind.

In the case of the light breeds of horses, also, richness of soil tends towards massiveness of shape, just the same as it does in the case of cart horses. But the requirements of this class of horse as regards suitability of soil are, of course, of a different nature to what they are in the case of the heavy Shire. They represent an altogether different type of horse, in which

the development of mere weight of body is not the principal desideratum. The biggest and most powerful light horses can be bred on soil which would not be suitable or good enough in point of richness for producing really weighty and first-rate Shire horse-stock. Moreover, the marshy, low-lying, rich pasture grounds, such as are found in the Fen districts and elsewhere, which are so admirably adapted for raising heavy draguht horses of the weightiest stamp, are by no means the most suitable for the production of good horses of the light class, while some light breeds cannot be bred successfully on them at all. For instance, they are unsuitable for raising thoroughbreds, or stout and tough hunters or Polo ponies. Light horses bred on this class of soil, it is true, develop much weight, and grow to a big size as a rule; but they are more or less coarse in type, and lack the quality and refinement which one looks for in well-bred animals, while invariably they are more or less soft in constitution. Furthermore, the quality of their bone and sinews is of an inferior character, these structures being deficient in toughness; and this last applies also to their feet, which generally incline to be of a flatter shape and more spreading than one likes to see in horses of the light class which are worked at fast paces, and whose feet consequently are subjected to a great deal of concussion. Altogether, therefore, such horses do not wear well, and their softness is a great disadvantage. Really tough, hard-wearing, and stoutly-constitutioned light horses, with strong legs, steely tendons, and good feet, can be bred only on up-lying pasture lands.

In no other direction does the nature of the soil exert a greater degree of influence upon the horse stock bred on it than it does in regard to the size and quality of the bone, and also the quality of the structure intimately connected with the bone—namely, tendons, sinews, and ligaments. The principal ingredients which go to build up the bones are lime and phosphates; hence, where the soil is deficient in these important constituents, the feed it produces does not contain a sufficient amount of bone-forming material to assure a full development of the bones in young horses, and under these unfavourable conditions they naturally remain light-boned and weedy. It is impossible to breed big-boned horse stock on such unsuitable land. In order to obtain ample bone development it is essential that an abundant supply of the mineral ingredients named, as well as of the others which contribute to the formation of bone, should be available in the soil of the rearing grounds.

Then, as regards the quality of the bone, this also varies on different kinds of soil. Some soils tend to produce dense, tough, and finely-textured bone, more or less ivory-like in its substance; while on others the tendency is for the bone to be of an inferior character, porous, soft, and of a coarse texture, although it may at the same time be abundantly developed. Quantity and quality of bone, in fact, by no means always go hand in hand. The quality of the tendons and ligaments is in all cases most closely associated with that of the bone. When the latter is flinty, flat, and ivory-like, the former structures are of an equally good quality, and possess toughness and strength, so that they are found to wear well. And similarly, when the bone is poor in quality, coarse, and with a tendency to roundness, instead of being nice and flat, the sinews are also of an inferior nature, and do not stand wear well, being neither strong nor tough.

Of the various kinds of soils, no other is so favourable to the development of big bone—and that of the very best quality—as a good limestone soil. This is admittedly the most suitable for the breeding of good horses, and especially of light horse stock of a tough and hard-wearing sort. Our stoutest and best horses are bred on land of the limestone formation.—"Live Stock Journal."

Poultry.

POULTRY AT THE QUEENSLAND AGRICULTURAL COLLEGE.

Mr. Harris, proprietor of "The Australian Hen and Fanciers' Guide," Sydney, was amongst the many Southern visitors to Brisbane during Exhibition week in August last. He visited many places of interest during his stay, including the Agricultural College, Gatton.

On his return to Sydney he wrote as follows on the subject of the College poultry and poultry yards, matters in which he naturally takes great interest:—

"From here we went on to the Gatton College, which we made headquarters for a day and two nights, through the kindness of friend "Bill."

It was rather gratifying to find here a state of affairs existing altogether different to those in vogue at some institutions of this kind.

For instance, we found in the Government pens birds of real merit to be the general rule. The Government Farm is a regular exhibitor at the biggest shows, entering in open competition. Thus, everyone is made acquainted with the exhibition quality of their stock from an unbiassed judge's standpoint, and not overcome by the mere glamour of Government ownership. It seems to us as long as the institution continues on present lines, and does not monopolise the show bench, as a too aggressive policy would enable it to do, this state of affairs is much better than that prevailing here, and could be advantageously copied.

In Silver Grey Dorkings the College had a most attractive team, and the same applies to their Spangled Old English; in both of these breeds they did well at the National, as the award list shows. The Minorcas are of both the fashionable show type, and the smaller utility bird, and in both sections they have some very nice birds.

Brown Leghorns are also bred for both show and utility, and while not perhaps up to the very high show standard attained in this breed in the Northern State, they are still good enough to win prizes, and lay like fun. They are a breed of which Mr. Hindes is very fond, and are extensively bred.

White Leghorns are bred for eggs and show, two distinct strains that achieve the objects desired, and that are scattered well over the Northern State, giving satisfaction wherever they have gone.

The White and Silver Wyandottes are likewise useful stock, and some of each have done well at the biggest shows. In addition there are Plymouth Rocks, one of which was good enough to annex the first ribbon at the National, and the others all well up to the standard, some very fine Indian Game, excellent Bronzewing turkeys, and Pekin and Indian Runner ducks.

The pens are all well and substantially built, and neatly arranged, though it apears to us that with a man who has done so much on so little, and given such satisfactory results as Mr. Hindes might well get a little more encouragement and a little more money to make improvements that will make for the economical and effective working of this section of the College work. Not that Mr. Hindes is grumbling—far from it; but it does not take a discerning visitor long to see the wistful manner in which he speaks of what are under present conditions impossible improvements.

In addition to the big range of the College pens, there are the competition pens, and though he has the help of the College pupils, it is easy for the reader to see that he has his hands full."

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order UMBELLIFERÆ.

Tribe Ammineæ.

SCANDIX, Linn.

Calyx-teeth none or minute. Petals emarginate. Fruit oblong, laterally compressed, beak many times longer than the seed, carpels terete or dorsally subcompressed, with a T-shaped groove on the inner face; primary ridges distinct, broad or narrow, secondary none; vittæ solitary in each furrow, slender or none; carpophore undivided or 2-fid. Seed, terete, dorsally subcompressed. Annual herbs. Leaves pinnately decompound, ultimate segments small, narrow. Umbels compound or simple; bracts one or none, bracteoles several; flowers white, polygamous, often radiant, species about ten, mostly Mediterranean plants.

S. Pecten-veneris, *Linn.* (Shepherd's Needle or Venus's Comb).—A branching annual, erect or spreading, 6 to 12 in. high, and more or less hairy. Leaves two or three times pinnate, with short segments cut into narrow lobes. Umbels terminal, two or three rays, without general involucres; partial involucres of several lanceolate bracts, often two or three-lobed at the top. Flowers almost sessile, small and white, with a few large outer petals. Fruit attaining near 2 in.; the carpels at the base cylindrical and ribbed, four or five lines long, the remainder occupied by a stiff, flattened beak, often compared to the tooth of a comb. A field weed of Europe, often met with in waste places, and is now becoming a weed at Ipswich, from which place I have received specimens from Mr. W. T. Jones.

Order MYRTACEÆ.

EUGENIA, Linn.

E. Simmondsiæ, *sp. nov.*—A tree of medium size. Branchlets crimson red, slender, quadriangur almost winged. Leaves ovate to ovate-oblong, 1 to 1¾ in. long, the petiole about 3 lines long, apex more or less pointed, narrowed towards the base; midrib prominent, lateral nerves numerous, about 20 on each side of the midrib, thin, parallel, and prominent in the dried leaf, oil-dots thinly scattered and rather large, no flowers seen. Fruits solitary or in pairs and sometimes 3 in a short raceme, terminal or in the upper axils; globose, red, about 1 in. diam., crowned by the short 4-lobes of the calyx; seeds numerous.

Hab.: Tambourine Mountain, *Mrs. J. H. Simmonds.* The species seems a near ally of *E. paniculata,* Banks and Sol, the *E. myrtifolia,* Sims, differing in inflorescence and fruit, and when the flowers are known they may show a further distinction.

Order SCROPHULARINEÆ

ANTIRRHINUM, Linn.

Sepals five, imbricate. Corolla compressed, base saccate; upper lip erect, two-lobed; lower spreading, three-lobed; palate broad, bearded, closing the throat. Stamens four, didynamous; anther-cells distinct, parallel. Style filiform, stigma two-lobed. Capsule ovoid or globose; cells many seeded, anterior opening by one pore, posterior by two-toothed pores, or both opening by one pore. Seeds minute, oblong, truncate, rugose or pitted. Annual or perennial herbs. Leaves entire or lobed, lower opposite, upper alternate. Flowers solitary and axillary or racemed, species about twenty-five. Natives of the northern temperate regions of the globe.

A. Orontium, *Linn.* The Lesser Snapdragon or Calf's Snout.—Annual or biennial. Stem 6 to 18 in. high, often slender, erect, usually glabrous below and glandular above, branches from the base. Leaves linear, sometimes very narrow, rarely oblong-lanceolate. Flowers axillary subsessile, rose-purple. Sepals longer than the corolla, very narrow, spreading. Capsule about ½ in. long, pubescent. Seeds compressed, face concave, back keeled, margin thickened. A native of East India, North Africa, and Europe. Met with in Queensland on and about rubbish heaps in the Southern townships.

Order PALMÆ.

As Dr. Odoardo Beccari's work "Asiatic Palms—Lepidocaryeæ" (Annals of the Royal Botanic Garden, Calcutta, Vol. XI.) is now to hand, I take the opportunity of placing our species of Calamus in accordance with that eminent botanist's arrangement.

In the Flora Australiensis, Vol. VII., 3 species are mentioned. *C. australis*, Mart.; *C. Muelleri*, Wendl. and Drude; and *C. caryotoides*, Mart.; *C. radicalis*. Wendl. and Drude being mentioned as a probable form of *C. Muelleri*. In my "Queensland Flora" I gave *C. obstruens*, F. v. M., *C. Moti*, Bail., *C. Jaboolum*, Bail., *C. Muelleri*, Wendl. and Drude, and *C. caryotoides*, Mart. In Dr. Beccari's present monograph we find *C. Muellerii*, Wendl. and Drude; *C. caryotoides*, A. Cunn.; *C. australis*, Mart.; *C. Moti*, Bail.; *C. radicalis*, Wendl. and Drude. In Baron Ferd. v. Mueller's Census are recorded *C. australis*, Mart.; *C. Muelleri*, Wendl. and Drude; and *C. caryotoides*, A. Cunn.

CALAMUS, Linn.

C. Muellerii, *Wendl. and Drude*, in Becc. Mono., page 199.—Scandent slender. Sheathed stem 3 to 4 lines diam. Leaf-sheaths flagelliferous, not gibbous above, rusty-furfuraceous, entirely covered with attendent or spreading chestnut-brown (ultimately deciduous?) bristles, which are 3 to 3½ lines long at most, and become closer, longer, and erect near the mouth of the sheath. Ocrea very short, horizontally truncate, very densely bristly-spinulous like the leaf-sheaths. Leaf-sheath flagella filiform, rather rigid, armed with very slender scattered claws. Leaves not cirriferous, short (about 12 in. long); petiole almost obsolete or very short, trigonous, bristly-spinulous at the sides, but chiefly underneath; rhachis rather densely furfuraceous like the petiole, trigonous, bifaced and acute above, flattish underneath, where sparsely and irregularly armed at the sides and along the middle with slender scattered recurved spines, which change towards the summit into small claws; leaflets few (11 to 14 in all) very irregularly set, lanceolate or linear-lanceolate, almost equally attenuate to both ends, acute at the base, subulately acuminate at the apex, thinly papyraceous, about the same colour on both surfaces, almost shining, 3-sub-5-costulate, the mid-costa slightly stronger than the side ones, all naked on both surfaces or sometimes the mid-costa furnished near the base on the upper surface with a few (1 to 4), pale, weak, 2½ or 3½ lines long spiculæ; transverse veinlets rather sharp and approximate; margins ciliated with small remote spreading spinules; the largest leaflets, the mesial about 7 or 8 in. long and from 8 to 12 lines broad, 3 to 4 of those nearer the base usually approximate and inserted very near to the sheath; the 4 uppermost also approximate and the two terminal free or more or less connate at the base.

Male spadix. . . . Female spadix supradecompound, elongate, flagelliform, very slender, with very few remote partial inflorescences; primary spathes very elongate, tubular, very closely sheathing, rather densely aculeolate, bristly at the mouth; the lowermost slightly compressed, the others cylindraceous; partial inflorescences, furnished with a filiform flattened peduncular portion, the largest among them (the lowest) 4 to 6 in. long with 6 to 7 spikelets on each side; secondary spathes very closely sheathing, tubular, slightly enlarged above, subtrigonous, smooth or aculeolate in their

upper part, truncate and ciliolate at the mouth, where acute at one side; spikelets inserted above the mouth of their own spatha, with a very distinct axillary callus; the largest (the lowest) 1½ to 2½ in. long, with 8 to 12 flowers on each side; the uppermost much shorter and with fewer flowers; spathes broadly infundibuliform, striately veined, truncate and subciliolate at the mouth, apiculate at the side; involucrophorum inserted at the base of the spathel above its own and with a distinct axillary callus, cupular, truncate and ultimately split, involucres cupular, often asymmetrically evolute; areola of the neuter flower rather large, slightly concave with acute borders. Flowers horizontally set. Fruiting perianth explanate, its calyx rather coriaceous, at first 3-toothed, later entirely split into 3 parts; corolla divided into 3 ovate-lanceolate thinly coriaceous segments one-third longer than the calyx; filaments of the stamens forming an urceolate cup which reaches to the middle of the corolla and is crowned by 6 triangular teeth. Fruit broadly obovate or subglobose, about 7½ lines long, and 6 lines broad, rounded at both ends, but topped by a short beak; scales in 18 series, yellowish, very faintly channelled along the middle and with a very narrow dark-brown intramarginal line; margins pale, scarious; tip short, triangular, erose-denticulate. Seed irregularly globose, 4½ lines diam. with a minutely rugulose testa and a rather deep chalazal fovea about the centre on the raphal side; albumen horny equable; embryo basal.—*C. Australis*, F. v. M. Fragm. Phyt. Austr. v. 49. *Becc. l.c.*

Hab.: This small lawyer cane is common in scrubs both north and south.

C. caryotoides (*A. Cunn.*), Becc. Mono., page 201.—Slender, scandent. Sheathed stem 2½ to 4 lines in diam., leaf-sheath gibbous above, finely striate longitudinally, furfuraceous in youth, later glabrous, densely covered with rigid hairs like deciduous spiculæ, which afterwards leave a subspiny tubercled base. Ocrea 2½ to 3 lines long, almost horizontally truncate, densely hispid, leaf-sheath-flagella slender, filiform very finely aculeolate. Leaves short, 10 to 16 in. long, not cirriferous; petiole almost obsolete or very short and thick with a distinct swelling or callus at the axilla; rhachis subtrigonous, bifaced above, armed irregularly, chiefly on the lower surface with very small claws and often sprinkled with black-tipped subspiny tubercles; leaflets very few (6 to 9 in all) very inequidistant, rigidulous papyraceous, rather shiny above, slightly paler beneath; the two of the terminal pair are more or less united (sometimes almost to the apex) and form a broad, furcate flabellum which is cuneate at the base and has a terminal margin truncate, sinuous and præmorse; side-leaflets alternate, oblong spathulate or more usually elongate-cuneate, gradually narrowing towards the base from near the apex, which is also irregularly truncate and præmorse; the largest (the mesial) 6 to about 8 in. long, 1¼ to nearly 2 in. broad, the lowest approximate, narrower and shorter, usually, divergent or even deflexed, all furnished with 5 to 7 slender costæ diverging from the base; costæ smooth on both surfaces, the central hardly stronger than the side ones, and all reaching the apex; transverse veinlets sharp, approximate and quite continuous; margins acute, more or less furnished with small and remote pinules. Male and female spadices almost the same and simply compound, inserted almost opposite the leaf near the mouth of the sheath with a distinct axillary callus, very slender, flagelliform, and terminating in a filiform aculeolate appendix; primary spathes very narrowly tubular, very long, and very closely sheathing, sparsely aculeolate, the lowest slightly flattened, the others cylindrical obliquely truncate at the mouth; axial portion between two partial inflorescences very slender and armed externally with small claws. Male spadix 3 feet to nearly 4 feet long, with 6-7 partial inflorescences, nodding, inserted inside their own spathes; the largest the lowest, as much as 6 inches long with 8-9 spikelets on each side; the others gradually smaller, the uppermost reduced to a few spikelets; secondary spathes tubular infundibuliform, closely sheathing, unarmed, obliquely truncate and with paleaceous cilia at the mouth;

spathels shortly tubular at the base, suddenly enlarged into a concave limb, striately veined and prolonged at one side into a spreading acute point; involucre almost entirely exserted from its own spathel and attached to the base of the one above, cupular, truncate, almost entirely or slightly bidentate and bicarinate on the side next to the axis. Male flowers narrowly oblong, 2 lines long; the calyx strongly striately veined, tubular, with 3 short very broad teeth; segments of the corolla shining and smooth externally, twice as long as the calyx. Female spadix somewhat shorter than the male one, 30-40 inches long, with 4-5 partial inflorescences which are short and broad, the largest (the lowest) about 3 inches long, with 6-7 spikelets on each side; secondary spathes as in the male spadix; spikelets slightly arched, horizontal or somewhat deflexed, attached just at the mouth of their own spathe with a distinct axillary callus, about 1 inch long and with 6-10 flowers on each side; spathels shortly tubular at the base, suddenly enlarged into a spreading broad concave limb, acute at one side; involucrophorum concave, with a short limb, inserted laterally almost entirely outside its own spathel, at the base of the one above; involucre cupular, entire; areola of the neuter flower lunate, relatively large and sharply bordered. Female flowers ovoid, about 1½ line long, horizontally attached; the calyx strongly striately veined with 3 broad acute lobes; corolla with acute and polished segments one-third longer than the calyx. Neuter flowers slightly smaller than the fertile ones. Fruiting perianth not pedicelliform. Fruit very broadly ovate or subsphæric rounded at both ends, but topped by a short beak, about ⅓ inch long including the beak and nearly the same in width; scales in 18 series, yellowish, superficially channelled along the middle, with a narrow dark-brown intramarginal line and scarious erosely toothed margins and tip. Seed irregularly globose, with rather smooth surface, very concave on the back and with a slightly depressed chalazal fovea on the raphal side; albumen equable; embryo basal. *Becc. l.c.*

Hab.: Endeavour River, *A. Cunningham*; Rockingham Bay, *J. Dallachy*; Russell River, *W. A. Sayer, Bailey*; Barron River, *E. Cowley*; Cooktown, *Dr. Roth.*

C. australis, *Mart.*, Becc. Mono., page 230.—High scandent, rather slender or of moderate size. Sheathed stem about 7½ lines diam. Leaf-sheaths flagelliferous, not gibbous above, obliquely truncate at the mouth, covered when young, as are the petiole and rhachis of the leaves and the spathes, with a rusty-grey detachable cottony indumentum and entirely clothed with very slender, brittle, flexible blackish or fuscescent, spreading, ⅓ to ¾ in. long, criniform spiculæ, which are denser and erect at the mouth. Leaf-sheath flagella with the basal spathe flattened, two-edged and furnished at the sides with long spiculæ. Leaves not cirriferous, rather short, about 24 in. in length; the petiole short, about 2 in. long, convex beneath, where almost unarmed or more or less furnished with small claws, flattish above, where more or less densely covered with spinulæ like those of the leaf-sheaths; rhachis bifaced and smooth above, roundish in the first portion, flat upwards, and irregularly armed throughout beneath along the middle and in the lower portion, also at the sides with rather small solitary or slightly aggregate claws; leaflets not very numerous, 10 to 18 on each side, alternate or almost opposite, 1½ to 2 in. apart, subequidistant, papyraceous rigidulous, shining, somewhat plicate longitudinally, subconcolorous and destitute of hairs, spinules, or bristles on both surfaces, lanceolate or narrowly lanceolate, rather suddenly contracted at their insertion on the rhachis, where often distinctly callous mainly in the lower leaflets, gradually acuminate into a subulate not bristly or ciliate apex, more or less deeply indented on the lower margin near the summit and terminating in a long (about 1 to 1½ in. long), very slender, bristle and deciduous thread; all the leaflets are of about the same size, 6 to 10 in. long, and from 10 to 14 lines broad, the lowest ones hardly smaller than those of the middle; the upper ones suddenly shorter than the others; the two of the terminal pair 2 to 4 in. long, obtuse and often distinctly bidentate at the apex; mid-costa rather acute and prominent in the upper face, secondary nerves slender and only one on each side of the mid-costa

more conspicuous than the others, but not so as to render the surface distinctly 3-costate; beneath all nerves less distinct than above; transverse veinlets fine, rather numerous and distinct; margin quite smooth or very sparingly appressedly spinulous. Male spadix fugaciously tawny-furfuraceous, elongate flagelliform; pendulous ultra-decompound with a long clawed flagellum at its summit strongly armed in the attenuated basal portion between two partial inflorescences with half-whorled black-tipped claws; primary spathes very elongate, tubular, cylindric, very closely sheathing, rather densely aculeolate in their upper part, obliquely truncate at the mouth where often somewhat split longitudinally and prolonged at one side into a triangular hispid point; partial inflorescences elongate, large and diffuse, as much as 24 in. long, arising erect from inside the mouth of their own spathe and then spreading, terminating in a short filiform closely sheathed caudate unarmed appendix, and bearing in their apical portion a few simple spikelets and in the lower one a few secondary branches, which latter are from about 3¼ to 4¼ in. long with 4 to 9 spikelets on each side; secondary spathes about 1 in. long, very narrowly tubular-infundibuliform, closely sheathing, narrowed at the base, unarmed, finely striately veined longitudinally, entirely green and not withered at the mouth where obliquely truncate, densely ciliated with fine paleolæ and prolonged at one side into triangular acute point; tertiary spathes infundibuliform, striately veined, sprinkled with small greyish scales; spikelets horizontal or deflexed, callous at their upper axilla, inserted just above the mouth of their own spathes complanate, pectinate; those of the upper part of the inflorescences 1½ to 2 in. long with 12 to 15 distichous very approximate flowers on each side; those of the branches or compound spikes about 1 in. at most, with about 10 flowers on each side, spathels very short, concave subbracteiform, with their apex acute and deflexed, striately veined, ciliolate and sprinkled with small grey scales; involucre almost flat, transversely evolute, acute at both sides. Male flowers very small, 1 line long, ovate or subovate, rounded and obtusely apiculate at the top; the calyx with a short striately-veined tube with 3 very broad triangular acute lobes; the corolla twice as long as the calyx or even longer. Female spadix simply decompound, the one seen entire with 6 partial inflorescences and about 6 ft. 6 in. in length, including a slender and culeolate apical flagellum of about 16 in. in length; lowest primary spathe flattened, two-edged, rather densely covered with spiculæ like those of the leaf-sheaths; the other spathes like those of the male spadix; largest partial inflorescences 9 to 18 in. long, bearing on each side 8 to 12 spikelets, these 2 to 6 in. long, flexuose, vermicular, narrowed and acute at the summit, with 8 to 14 flowers on each side; spathels broadly infundibuliform, somewhat narrowed at the base, finely striately veined, truncate at the mouth and prolonged at one side into a triangular acute point; involucrophorum almost included in its own spathel and attached at the base of the one above, sub-cupular, acutely bidentate and two-keeled and deeply lunately emarginate on the side next to the axis; involucre sub-cupular, symmetrically evolute, bidentate and also lunately emarginate on the side next to the axis; areola of the neuter flower broadly lunate, very acute at both sides and sharply bordered. Female flowers small, about 1½ lines long, ovate acute, somewhat ventricose when in the bud; the calyx deeply divided into 3 ovate concave, acute, strongly striately veined lobes; the corolla with segments smooth outside, slightly longer than the calyx. Fruiting perianth explanate. Fruit subsphæric, about 7 lines in diam., minutely apiculate; scales light-yellowish, subshining, slightly channelled along the middle, with a very narrow rusty intramarginal line, and a scarious erosely toothed margin. Seeds subglobose-ovoid, about 4½ lines long and about 4 lines in diam., with an even, not pitted surface and a rather deep chalazal fovea placed above the centre on the raphal side; albumen equable; embryo basal.—*C. obstruens*, F. v. M.; *C. Jaboolum*, Bail. *Becc. l.c.*

Hab.: Cape Grafton, *Martius*; Fitzroy Island, *MacGillivray*; Rockingham Bay, *J. Dallachy*; Barron River, *E. Cowley* and — *Diels*.

C. Moti, *Bail.* Bot. Bull. XIII. and Becc. Mono., page 232. Sheathed stem about 1 in. in diam. Leaf sheaths cylindraceous, very obliquely truncate at the mouth, very densely armed with not very large (5 to 7½ lines long) spreading fulvous acicular spines, which are confluent by their irregularly and very closely seriate rather swollen bases. Ocrea very short, at first truncate, later forming a narrow border to the mouth of the sheath, where it is armed with crowded slender fulvescent spiculæ. Leaf-sheath flagella. . . . Leaves large, not cirriferous (one entire leaf measured about 5 ft. 10 in.); petiole covered (like the rhachis) with dark furfuraceous scales, stout, about 8 in. long, almost perfectly cylindrical in its lower portion, narrowly and deeply channelled upwards above, furnished at the sides with small prickles (some of these appearing also at the sides of the rhachis) and armed beneath along the middle with rather strong, straight, about ½ line long, slightly deflexed aculei which extend lower down along the back of the sheath and higher up pass into the rhachis, where they are transformed into small claws; the claws disappear in the intermediate portion of the leaf and reappear, but much smaller, in its upper part; above (the rhachis) is acutely bifaced with the angle smooth and the faces rather concave, and is furnished at the sides with some very small aculei; leaflets very numerous, very regularly equidistant from the base to the top; in the intermediate portion about 1¼ in. apart on each side, closer towards the apex; alternate or subopposite, papyraceous, rigidulous, subconcolorous on both surfaces, slightly paler underneath, subshining above, elongate-lanceolate or ensiform, slightly attenuate at the base, where suddenly plicate, and not callous at their insertion, very gradually long-acuminate into a subulate very slender tip, which is sparingly bristly spinulous at the sides, with 3 slender costæ, which are all furnished above with brown bristles (these scarcer on the mid-costa) and naked beneath; transverse veinlets sharp, rather remote and interrupted; margins finely and very appressedly spinulous, slightly thickened by a marginal nerve; all leaflets almost of the same size, those a little above the base the largest, 16 to 18 in. long, 10 to 12½ lines broad, only those near the summit narrower and shorter; the two of the terminal pair very narrow and free at the base. Male spadix. . . . Female spadix simply decompound, elongate, terminating in a very long and robust flagellum (over 6 ft. long in some specimens) which is strongly armed with robust, very broad-based black-tipped claws; primary spathes. . . . ; partial inflorescences elongate-paniculate; the one seen by me (Dr. Beccari) 15 in. long, with 8 spikelets on each side; secondary spathes tubular-infundibuliform, closely sheathing, somewhat narrowed at the base, unarmed, indistinctly striately veined, truncate at the mouth, prolonged at one side into a short erect point; spikelets cylindraceous, rather thick inserted just outside the mouth of their own spathe and arising erect from this and then arched downwards, not disstinctly callous at their upper axilla; the largest, the lower ones, about 2 in. long, with 5 to 6 flowers on each side, the upper ones shorter; spathels tubular-infundibuliform, slightly narrowed to the base, horizontally truncate and entire at the mouth, prolonged at one side into a short triangular point; involucrophorum exsert from its own spathel and laterally attached at the base of the one above, almost regularly cupular, not callous at its axilla, slightly bidentate on the side next to the axis; involucre cupular, truncate, slightly lunately emarginate and bidentate on the side of the neuter flower; areola of the neuter flower distinctly lunate, rather concave, with sharp borders. Fruiting perianth not pedicelliform. Fruit subsphæric, about 6 lines in diam., suddenly topped by a rather large mucro; scales in 17 to 18 series, yellowish-brown, somewhat shining, slightly channelled along the middle, with a very dark intramarginal line, the short tip and margin erosely toothed. Seed subdimidiately globular, 4 lines long, with uneven but not pitted surface, very convex on the back, and with a very deep circular chalazal fovea on the raphal side; albumen equable; embryo basal.

The characteristic marks of this species are: Leaf-sheath densely armed with subseriate spreading spines; the large leaves with terete petiole and numerous large ensiform leaflets, which are bristly on 3 costa above; and the spadix with a very long and strong terminal clawed flagellum. *Becc. l.c.*

Hab.: Barron River, *E. Cowley* and — *Diels.*

C. radicalis, *Wendl. and Drude*; Becc. Mono., page 234. Stem. . . Leaf-sheath flagelliferous and densely aculeate (Wendland and Drude). Leaves not cirriferous, with numerous equidistant leaflets (Wendland and Drude); in the small portion by me (Dr. Beccari) probably from the middle the rhachis is fugaciously furfuraceous, flattish below, where armed along the middle with small solitary claws, bifaced above, where furnished on the acute angle with some very slender bristly spinules; leaflets alternate, about 1¼ in. apart, elongate-lanceolate or ensiform, rather suddenly plicate at the base, gradually long acuminate into a subulate bristly-spinulous apex, 18 in. long and 10 to 11 lines broad, green even when dry, rather shining on both surfaces, hardly paler beneath thinly papyraceous, subtricosterlate mainly near the base in the upper surface, where the mid-costa is acute and raised, and the side costa are very slender, evanescent, and undistinguishable from some other secondary nerves towards the apex; the 3 costulæ are furnished above with a few long dark bristles; on the undersurface the mid-costa is not prominent, and on this as well as on 1 to 2 slender nerves on each side of it are some very small appressed spinules easily overlooked; margins with many very short approximate appressed spinules; lower margins slightly thickened by a slender nerve; transverse veinlets rather sharp; rather distant, much interrupted. Other parts unknown.

This Calamus has been described by its authors as stoloniferous, high scandent, with non-cirriferous leaves, which bear numerous equidistant leaflets and with flagelliferous densely aculeate leaf-sheaths: but the description is based on the specimen of only one leaf, a fragment of which I received from the late Baron Ferd. von Mueller. With such imperfect material it is very difficult to point out the affinities of this species, though very probably it will range near *C. Australis*. Certainly it cannot be referred to *C. Muellerii*, as was supposed by Bentham, nor to any other known Australian Calamus, except to the recently described *C. Moti*, Bail. A leaf of a Calamus gathered by Miss E. Bauer on the Bloomfield River, Queensland, and also communicated to me by F. von Mueller, probably belongs to *C. radicalis*. *Beccari l.c.*

Hab.: Mackay, *J. Nernst.*

Order GRAMINEÆ.

Tribe Chlorideæ.

ELEUSINE, Gærtn.

E. aristata, *Ehrenb.* *Hook. f.*, Fl. Brit. Ind., VII., 296.—Plant perennial like couch and buffalo, the creeping stems smooth, the erect ones 4 to 12 in. high, the internodes 2 to 4 in. long. Leaves 1½ to 4 in. long, acuminate, margins ciliate, with long tubercel-based hairs; sheaths hairy; ligula obsolete. Spikes three or more, from ½ to over 1 in. long, spreading, or decurved, ciliate or bearded at the base, midrib of rhachis, excurrent. Spikelets short, 3 to 4-fid., rhachilla glabrous, first and second glumes coriaceous, one-nerved, margins membranaceous. First glume small, broadly oblong, apiculate; second glume very broad, sometimes didymous when spread open; awn stout, subulate, incurved or recurved; third and following glumes longer than the second, very broadly ovate, subacute, glabrous; paleæ broad, keels scaberulous. Grain ovoid, rugous.

Hab.: India, Afghan, Arabia. In Australia, Port Darwin. *Rev. J. E. Tenison-Woods.* Stannary Hills, *Dr. Thos. L. Bancroft*, and other tropical localities, now pretty common about Brisbane. This and *Microlæna stipoides*, R. Br., are the two best grasses we have for growing under the shade of trees, the first is also excellent for lawns.

Tropical Industries.

FIBRE CONGRESS AT SOURABAYA, JAVA, OCTOBER, 1910.

Few people in Queensland have any idea of the rapid strides which are being made in all suitable districts throughout the tropical world, in the cultivation of fibre plants, especially of sisal and Mauritius hemp (Fourcroya). Even in our own State, plantations of sisal are quietly being formed in the North, and only lately an immense area of land for this purpose, situated near Cooktown, was applied for. In New Guinea, large areas are already planted, and quantities of fibre are being turned out. On one plantation alone in that territory, three steam-driven machines are at work. The price of sisal fibre has risen considerably of late, and more especially is this the case with Fourcroya fibre (Mauritius hemp), which is now quoted in the British market at £24 per ton for "fully good fair." Messrs. Landauer and Co., London, in their "Weekly Market Report" on fibres (25th August) state that "there is excellent demand for Mauritius, but the absence of stocks renders any large business impossible. As regards sisal, supplies during July were only 46,840 bales, as against 83,864 in July, 1908. New Zealand hemp is quoted at £25 10s. per ton, whilst tow (waste from the machines) is worth £9 5s. per ton, without any guarantee being required as to quality, and Indian hemp, too, sells from store freely at £11 to £15 per ton according to quality. Best Manila is now bringing from £36 to £40 per ton, the very lowest qualities having sold at 2½d. per lb., or £18 13s. 4d. per ton. It will thus be seen that our prediction—that the late slump in fibre prices would only be temporary—is fully borne out. In connection with the fibre industry and with a view to promoting the cultivation of fibre-producing plants, the Nederlandsch-Indisch Landbouw Syndicaat has decided to hold, at Sourabaya, Java, Netherlands East India, in October, 1910, a congress combined with an exhibition of fibre-producing plants, of the fibres produced therefrom, and of the machinery used in the preparation of the same.

During the congress the cultivation and preparation of the raw fibre, both mechanically and manually, will be discussed. The extraction, preparation for market, and packing of the fibre will, as far as possible, be demonstrated. Various prizes, medals, diplomas, and money prizes will be offered for machinery. Prizes will be awarded to the exhibitors of machines working for a sufficient time during the congress that are considered worthy of an award by a committee of impartial experts. The expenses of the congress and exhibition will be defrayed by the syndicate, which is enabled to do so by a liberal grant from the Netherlands Indian Government and substantial contributions from commercial houses and private persons.

In conjunction with the director of agriculture a committee has been formed to prepare and carry out the scheme, while a number of gentlemen in Holland have been requested to form a sub-committee there. A prominent place in the programme will be given to the consideration of the cultivation and preparation of those fibres most suitable for culture on a large scale in the tropics. Special attention will be given to the following, viz.:—

(1) Agave fibre (sisal hemp), the cultivation of which is spreading so largely and which is specially adapted to dry tropical countries.

(2) Manila hemp, also a fibrous plant fit for cultivation on a large scale, which produces a profitable crop in well-watered districts of tropical countries.

(3) Jute and jute substitutes. Of importance in all tropical countries, seeing that a large part of the packing material necessary for other produce is made therefrom. As the cultivation of agave fibres and Manila hemp and the like can be remunerative only when carried on with efficient machinery for the treatment of the fibre on a large scale, and when suitable hand machines are available for the use of the small producer, special attention will be paid to the testing of machines sent to the congress for exhibition, as regards both the extraction and treatment of the fibre. In addition to the above named, other fibres may be dealt with more or less fully according to the interest shown at the congress.

A detailed programme will shortly be published dealing with the project in all its particulars and enumerating the prizes to be awarded. This preliminary notice will serve to make known to all those who are interested in the cultivation of fibres in tropical countries the opportunity shortly to be offered of exchanging ideas on the subject, and will give timely notice to manufacturers of machinery of the opportunity to be given for displaying the merits of their respective machines.

It is to be hoped that some one amongst the sisal growers in Queensland will be able to attend this congress, the results of which should prove of far-reaching benefit to all engaged in the industry, and especially with regard to fibre extracting machinery.

OF INTEREST TO SUGAR-GROWERS.

The annual maple sugar output of Canada is about 9,000 short tons. A tree will yield from 2 lb. to 3 lb. sugar annually. Several of the United States also are producers of maple sugar.

Maize stalks have been successfully made into paper in the United States; and it is suggested that within a few years the Federal Union will be looking to the Gulf States for a large fraction of its supply of paper stock, whether in the form of sugar-cane megass, or corn stalks. The fuel value of megass at the sugar factories where it is produced will, it is thought, always interfere more or less with its successful utilisation for paper stock.

The increasing manufacture of pure white beet sugar directly from the juice in hundreds of factories arranged for the purpose is driving the refineries out of the business.

Japan had last year some 45,000 acres under sugar-cane, and the amount of sugar obtained was 50,872 tons. Great attention to sugar growing is now being paid by the Japanese to the growth of sugar in the island of Formosa, which has an area of about 15,000 square miles.

The Japanese hope to make Formosa the source of supply for all their requirements in sugar production. The chief demand in Japan is for a yellow sugar with a bright sparkle.

In Argentina, the average production of sugar at all the factories for the year 1908 was 8·21 per cent. of the weight of cane crushed. The total yield was 136,447 metrical tons, from 1,661,732 tons cane crushed.

It is found impossible to accurately estimate the sugar production of India; but it is believed to be not much under five millions of tons. Methods of manufacture are, as a rule, very crude, and in many instances the juice is expressed by means of wooden rollers moved by two yoke of oxen.

Experiments on a large scale on one of the Argentine plantations are said to have established an increased production of cane amounting to 40 per cent.,

as the result of using sulphate of ammonia as a fertiliser. In a number of experimental plots, the increase in the yield of sugar amounted to from 10 to 12 per cent. in favour of the plots on which fertiliser had been used.

The scarcity of labour is leading to the adoption of mechanical tillage and of labour-saving devices in British Guiana wherever they can be applied.

The sugar trade of Java is said to be booming to a remarkable extent. At Tandjong Priok there were fourteen vessels loading sugar at the same time, their destinations being Calcutta, Aden, and European ports.

Sugar machinery for Formosa is being manufactured in Honolulu, both mill houses and machinery being constructed on the best lines adopted in Hawaii. Millions of dollars have already been paid by Formosan companies for machinery.

Louisiana has about eighty highly efficient sugar factories, ranging in daily cane crushing capacity from 700 to 2,000 tons, though of the latter size there are but two. The tendency is for the smaller mills to be closed down in favour of the larger and more perfectly equipped.

Two good seedling canes introduced by the sugar experiment station are rather extensively cultivated in Louisiana.

The total sugar production of Brazil for the season of 1907-8 was but 130,000 tons. The estimated output for 1908-9 is placed at 210,000 tons.

The Cuban sugar crop is apparently subject to serious fluctuations. A recent return shows that total receipts for the twelve months ended 28th February were:—In 1907, 658,756 tons; 1908, 407,688 tons; 1909, 593,848 tons.

The imports of sugar into Japan from foreign countries in 1907 amounted to a value of £2,027,900, as compared with £2,421,900 in 1906, and £1,399,200 in 1905—the bulk in each year being from the Dutch Indies. Exports of raw sugar from the Formosan ports to Japan amounted to in 1907 52,696 tons, valued at £733,142.—"Australian Sugar Journal."

SISAL HEMP FROM EAST AFRICA, UGANDA, AND NYASALAND PROTECTORATES.

EAST AFRICAN PROTECTORATE.

A sample of sisal hemp recently received at the Imperial Institute, London, from East Africa, consisted of well-cleaned fibre, nearly white, very lustrous, of excellent quality and good strength, and about 5 ft. long.

The fibre was analysed and submitted to commercial experts, who stated that it was identical with that produced in German East Africa during the last three or four years. They reported that fibre equal in quality to the sample submitted would find a ready market in London at £29 per ton, with Mexican sisal at £24 per ton.

UGANDA.

This sample consisted of white fibre, of fair lustre, very well cleaned, of rather uneven strength, and about 4 ft. 9 in. long. It was of the same character as the sisal hemp prepared in East Africa, but was of rather less regular strength. It was of excellent quality, and was regarded as readily saleable at £27 to £28 per ton, with best Mexican at £25 per ton.

NYASALAND.

This sample consisted of nearly white fibre, of good lustre, well cleaned, of excellent strength, and from 4 ft. to 4 ft. 6 in. long. It was superior to that from East Africa with which it was compared, and its commercial value was regarded as about equal to that of Mexican sisal.

Science.

INSECTICIDES AND FUNGICIDES.

By J. C. BRÜNNICH, Chemist to the Department of Agriculture and Stock.

The use of insecticides and fungicides is becoming daily more popular amongst our fruit-growers and farmers, and it is of the greatest importance to the users to know what they really get for their money.

Some of the agents submitted samples of their preparations, other samples were collected by Mr. A. H. Benson, the Instructor in Fruit Culture, and the analytical work was carried out in our agricultural laboratory.

1.—Oil and Soap Insecticides.

(*a*) *McDougall's Garden Insecticide Wash*.—The analysis of this well-known preparation shows it to contain—

Analysis No.	Moisture.	Combined Acid Anhydride.	Unsaponifiable Matter Free Acid, &c.	Soda.	Potash.	Undetermined Glycerine, &c.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1379	48·80	32·70	5·47	4·77	4·05	4·21
		Containing 13·29 per cent. Resinanhydride.				

This compound, practically a resinous soft soap, contains only a small amount of free alkali (·22 per cent.), and is free, as guaranteed, from arsenic, copper, and other poisons. It mixes readily with water, forming a good emulsion, and is used in proportion of 1 pint to 4 to 12 gallons of water. The cost of the wash is trifling, and, according to the strength, would be from 4s. 6d. to 13s. 6d. per 100 gallons of spray.

(*b*) *Scalecide* is an oily liquid which, when added to water, forms a milky emulsion, it contains—

Analysis No.	Moisture.	Soap.	Unsaponifiable Mineral Oil.	Mineral Matter other than Potash in Soap.	Potash in Soap.	Free Alkali.
224	Per cent. 11·15	Per cent. 5·40	Per cent. 82·50	Per cent. 1·08	Per cent. 1·88	Nil

The unsaponifiable oil is purely mineral, most likely a shale oil or crude petroleum, and of high boiling point, as shown by the fractional distillation which yielded at—100 deg. C., 10 per cent. (water); 210 to 260 deg. C., 5·9 per cent.; 260 C. to 300 deg. C., 10·25 per cent.; 300 to 360 deg. C., 7·0 per cent. Residue at 360 deg. C., 66·9 per cent.

Scalecide is unquestionably a good preparation, but the exorbitant price completely forbids its use. One hundred gallons of spray would cost about 45s., whereas the same quantity of kerosene emulsion could be produced for less than 10s.

2.—Arsenical Insecticides.

Arsenates of Lead.—This compound being the least soluble of arsenical preparations is now largely used for the destruction of insects in place of Paris green, London purple, &c., as, on account of its insolubility, it is not liable to scorch the leaves. Several manufacturers' preparations are now in

the market, all being sold in the form of a white paste, which readily mixes with water. The amount of water varied from 42 to 67 per cent., and the containers marked to contain 1 lb. net, actually contained only about half of this weight as arsenate of lead. The platypus brand, which contained the highest amount of water, contained an extra weight of material in the jar, without, however, bringing the arsenic content up to any of the other brands.

The compositions by analyses of the various brands are as follows:—

Analysis No.	Brand.	Moisture.	Total Lead Oxide.	Total Arsenic Oxide.	Soluble Extraneous Matter.	Remarks.
		P. cent.	P. cent.	P. cent.	P. cent.	
187	Swift's Arsenate of Lead	42·80	39·70	17·04	1·50	Containing no arsenite, and only faint traces of soluble lead and arsenic salts
223	Do. do. (2nd sample)	43·80	39·82	15·74	·20	No arsenite, and traces of soluble lead and arsenic only
233	Platypus	67·20	24·50	7·80	·68	Do. do.
296	Blyth's Blue Bell... ...	50·90	34·90	10·72	2·18	Do. do.

It will be noticed that all the samples were free from arsenites, and soluble lead and arsenical salts. Sample 187 was a much more finely divided precipitate than the others, and remained, therefore, much longer in suspension when mixed with water. For use, the makers recommend to use from 2 to 3 lb. of the pasty arsenate per 50 gallons of water, and in order to compare the actual value of the different preparations, I computed the following table, which is based on net weights, costs, and analyses of the preparations:—

—	Net Weight of Preparation in 1-Lb. Jar.	Containing Oz. of Arsenic Oxide.	Cost of 1 Per Cent. of Arsenic in Pence.			Cost of 100 Gallons of Spray containing 1 per cent. of Arsenic.
			1-Lb. Jar.	50-lb Keg.	Cheapest Rate for Large Quantities.	
	Oz.					s. d.
Swift's	16	2·72	1·41	·705	·675	6 0
Do.	16	2·52	1·52	·762	·730	6 6
Platypus	21	1·64	2·34	1·27	1·27	10 10
Blue Bell... ...	16	1·71	1·68	·886	·653	7 6

A spray containing ·1 per cent of arsenic oxide is the strongest application (using 3 lb. of arsenate of lead per 50 gallons) recommended, and for many purposes a much weaker spray only one-third or half of this strength may be used. The cost per 100 gallons is calculated on the basis of the cost of the compound in 50 lb. kegs, and it will be seen that the cost would be even less when getting very large quantities, and that in this case Blyth's Blue Bell would be a little cheaper than Swift's. When purchasing the arsenate in the 1 lb. jars the cost, of course, would be just about doubled.

3.—FUNGICIDES.

(*a*) *Copper Sulphate.*—A sample of commercial copper sulphate received from the Instructor in Fruit Culture, was found to contain 31·84 per cent. Cupris oxide, and is consequently a pure crystallised salt. This is very satisfactory, as large quantities of this salt are at present used for the spraying against potato blight.

(*b*) *Sulphur Wash* is a sample of a concentrated lye of polysulphide of soda, obtained as a bye-product in one of our soap works, and was found to contain 35·60 per cent. of sulphur and 14·6 per cent. sodium.

THE FERMENTATION OF CIGAR-LEAF TOBACCO.

By J. C. BRÜNNICH, Chemist to the Department of Agriculture and Stock.

The fermentation or sweating of cigar-leaf tobacco is of the greatest importance to produce an aromatic leaf, free from harsh, bitter, or other objectionable taste. A large amount of work investigating this process has been carried out in the United States of America, and the results of the experimental work with Florida and Connecticut cigar leaf are given in Report No. 60—"Temperature Changes in Fermenting Piles of Cigar-leaf Tobacco," by Milton Whitney and Thos. H. Mears.

In the course of these experiments Dr. Loew made an examination of the different leaves, which led to a discovery of the greatest practical importance. Dr. Loew proved that the curing and fermenting of tobacco is not due to the action of certain bacteria, as stated by many authorities, but is caused mainly by the oxidising action of soluble ferments or enzymes, called oxidase and peroxidase. He showed that the formation of these important organic compounds can be increased by certain treatment of the leaves, as by slow drying of the leaves in barns or sheds, and, again, can be completely prevented from developing when the leaves are suddenly dried by a dry warm wind.

For the most favourable development of the oxidases a suitable amount of moisture in the leaves is an absolute necessity, but an excess of moisture again will be detrimental. The presence of the enzymes, oxidase, and peroxidase is absolutely necessary to produce the proper fermentation of the tobacco leaves, which takes place with a considerable rise of temperature. The Florida leaf shows a particular vigorous fermentation, with great heating, whereas the Connecticut leaves fermented slowly without much increase of temperature, and, therefore, the fermentation failed to destroy by oxidation many of the undesirable substances contained in the tobacco.

Mr. R. S. Nevill, the Tobacco Expert of our Department, noticed a similar trouble in some of the cigar-leaf tobacco grown at Bowen, and he submitted two samples of cigar leaf from the same crop to be tested in accordance with Dr. Loew's method for the presence of oxidase and peroxidase. One of the samples—unfermented leaf—had hung in the sheds for months, subject to weather changes, the other sample—fermented leaf—was stripped and packed in boxes early in the season.

The fermentation was unsatisfactory by reason of the very low rise of temperature (106 degrees) obtained, and Mr. Nevill attributes this to insufficient amounts of oxidase and peroxidase present. Our tests distinctly proved the *complete absence* of *both oxidase and peroxidase* in the unfermented leaf, and the presence of peroxidase and absence of oxidase in the sweated sample.

Mr. Nevill explains the entire absence of the oxidising enzymes in the unfermented leaf to its having been so long exposed to the weather changes, and I believe this to be correct, particularly if the tobacco was dried very suddenly by warm winds. That some of the enzymes developed in the sweated leaf shows the advantage of preventing such exposure by bulking the tobacco as soon as dried sufficiently. The accurate judging of the amount of moisture is, as already explained, of utmost importance, and we will never be able to produce a high-class cigar-leaf if strictest attention is not paid to all details of stripping, drying, and bulking, as all the operations have an influence of the amount of oxidases formed in the leaves, and without the presence of oxidases a proper fermentation is an impossibility. Based on this investigation, Mr. Nevill makes the following suggestions:—Drying-sheds should be made of grass or wood, to be closed or kept open as desired, so that the tobacco could be dried slowly under uniform conditions, and be protected from extremes of heat and wind, so that the oxidising enzymes may be developed and preserved for the subsequent stages of fermentation.

It would be of particular interest if next season more samples of tobacco, treated under various conditions and in different classes of sheds, were submitted to us, in order to be tested similarly for the absence or presence of oxidising enzymes.

General Notes.

IMPORTATION OF TOBACCO INTO AUSTRALIA.

By R. S. NEVILL, Tobacco Expert.

The Annual Report of the Bureau of Statistics, Department of Commerce and Labour for the United States, has been issued and published by the "Western Tobacco Journal." It shows the amount of tobacco sent to Australia, as follows:—

LEAF TOBACCO TO BE MANUFACTURED HERE.

1908.	1907.	1906.
12,703,255 lb.	9,265,874 lb.	7,141,013 lb.

This large increase is partly accounted for because the importations of 1908 were of unstemmed tobacco, and of 1906 mostly stemmed tobacco. The stems would amount to something like 4,000,000 lb.

MANUFACTURED TOBACCO.

1908.	1907.	1906.
1,632,342 lb.	2,540,856 lb.	3,110,013 lb.

This heavy falling off of the imports of manufactured tobacco shows a material increase in the manufacture of tobacco within the States.

Leaf tobacco imported in 1908—12,703,255 lb. less 4,000,000 stems, leaves 8,703,255 lb. manufactured here, as against 7,141,013 manufactured here in 1906, or an increase in the local manufacture of 1,562,242 lb.

Imported leaf, less stems, 1908	8,703,255 lb.
Imported manufactured, 1908	1,632,342 lb.
Total	10,335,597 lb.
Imported leaf (stemmed mostly), 1906	7,141,013 lb.
Imported manufactured, 1906	3,110,013 lb.
Total	10,251,026 lb.

Increased imports for the three years, 84,571 lb.

As increased consumption is probably keeping pace with increased population, the above shows that there has been a very material increase in the consumption of the locally grown tobacco.

This result has been brought about both by the improvement in the quality of our local tobacco and the artificially high prices ruling in the United States, also the measure of protection given both the local producer and manufacturer.

This increase of the consumption of our local tobacco would have been much greater had it not been that local causes resulted in short crops. That our Queensland tobacco is improving in quality and increasing in favour is shown by the fact that our last crop has been sold at something like 8d. per lb. all round, and none is now left in the growers' hands. Also the largest buyers have built three large factories with a stem redrying plant at Texas, the centre of the growing district, with a capacity for stemming, drying, and packing something like 1,000,000 lb. annually. Evidently Queensland tobacco has come to stay, and if we have a seasonable year there will probably be

planted the coming season of pipe tobacco between 1,000 and 1,200 acres. There will also be planted the coming year about 100 acres of cigar leaf. The last crop has been sold at an average of about 1s. 4d. per lb. There is not yet so large a demand for this type of tobacco, but we hope to gradually increase it as the farmers now realise the importance of producing a good quality. They are also taking up the sweating of their own crops, as practised in the United States, and will thus enhance its value materially, and also increase the local demand, and we hope in a few years to have an export demand.

Importations of cigars from U.S.—1908, 5,000; 1907, 5,000; 1906, 106,000.

Importation of cigarettes from U.S.—1908, 29,776,000; 1907, 32,124,000; 1906, 154,230,000.

BLACKLEG VACCINE.

The attention of our readers is drawn to the advertisement on page xi. of the Public Announcements specifying the terms upon which Double Blackleg Vaccine can be supplied to stockowners.

Times of Sunrise and Sunset at Brisbane, 1909.

DATE.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·58	6·5	4·46	6·28
2	6·2	5·34	5·28	5·48	4·58	6 6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·35	5·26	5·49	4·56	6·7	4·46	6 30
5	5·59	5·35	5·25	5·49	4·56	6·8	4·46	6 31
6	5·58	5 36	5·24	5·49	4·55	6·9	4·46	6·32
7	5·57	5·36	5·22	5·50	4·54	6·9	4·46	6·32
8	5·55	5·37	5·21	5·50	4·54	6·10	4·46	6·33
9	5·54	5·37	5·20	5·51	4·53	6·11	4·46	6·34
10	·53	5·38	5·19	5·52	4·52	6·12	4·46	6·34
11	5·52	5 38	5·18	5·52	4·52	6·12	4·46	6·35
12	5·51	5·39	5·17	5·53	4·51	6·13	4·47	6 36
13	5·50	5·39	5 16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·50	6·15	4·47	6·37
15	5·47	5·40	5·14	5·55	4·50	6·15	4·47	6·38
16	5·46	5·40	5·13	5·55	4·49	6·16	4·47	6·38
17	5·45	5·41	5·12	5·56	4·49	6·17	4·48	6·39
18	5·44	5·41	5·11	5·56	4·49	6·18	4·48	6·39
19	5·43	5·42	5·10	5·57	4·48	6·18	4·48	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·49	6·41
21	5·41	5·43	5·8	5·58	4·47	6 20	4·49	6·41
22	5·39	5·43	5·7	5·59	4·47	6·21	4·50	6·42
23	5·38	5·43	5·6	5·59	4·47	6·22	4·51	6·42
24	5·37	5·44	5·5	6·0	4·46	6·23	4·51	6·43
25	5·36	5·44	5·4	6·0	4·46	6·23	4·52	6·43
26	5·35	5·45	5·3	6·1	4·46	6·24	4·52	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·26	4·54	6·44
29	5·31	5·46	5·1	6·3	4·46	6·26	4·54	6·45
30	5·30	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

PHASES OF THE MOON.

		H. M.
7 Sept.	☽ Last Quarter	5 44 a.m.
15 "	● New Moon	1 9 "
23 "	☾ First Quarter	4 31 "
29 "	○ Full Moon	11 5 p.m.
6 Oct.	☽ Last Quarter	4 44 p.m.
14 "	● New Moon	6 13 "
22 "	☾ First Quarter	5 4 "
29 "	○ Full Moon	8 7 a.m.
5 Nov.	☽ Last Quarter	7 38 a.m.
13 "	● New Moon	0 18 p.m.
21 "	☾ First Quarter	3 29 a.m.
27 "	○ Full Moon	6 52 p.m.
5 Dec.	☽ Last Quarter	2 12 a.m.
13 "	● New Moon	5 59 "
20 "	☾ First Quarter	0 18 p.m.
27 "	○ Full Moon	7 30 a.m.

Answers to Correspondents.

MANGO CHUTNEY.

Mango, Lower Burdekin.—

We have so frequently given recipes for making mango chutney that we have apparently fallen into the error of thinking that our readers must be fully instructed in this branch of the housewife's department. However, here is another receipe, which was published some time ago in the "Bulletin of the Botanical Department of Jamaica":—

3 lb. common mangoes (turned, but not ripe), 3 lb. tamarinds, 2 lb. raisins (weighed after stoning), 8 lb. brown sugar, $\frac{1}{2}$ lb. chillies, 2 lb. green ginger, $\frac{1}{2}$ lb. garlic or $1\frac{1}{2}$ lb. onions, $\frac{1}{4}$ oz. mace, 1 oz. mustard seed, $\frac{1}{4}$ oz. cloves, $\frac{1}{4}$ oz. pimento, $\frac{1}{2}$ lb. table salt.

Soak the tamarinds in 2 quarts of the best vinegar, stir them about with a wooden spoon to get the pulp off, and take out the seeds and the leathery part in which they are enclosed. Cut the raisins small. Peel the ginger and grate it. Pound the chillies, garlic, and mustard seed in a mortar, using a little vinegar to moisten. Mix all together thoroughly; it is then ready for use.

TRYPAN BLUE.

A. Hall, Mooloolah.—

Trypan blue is not as yet procurable in Australia, but it is understood that last October several of the wholesale chemists ordered it from Europe, and, in that case, it should be available early in 1910. As it is a new drug in reference to redwater, very little is as yet known as to the proper dose and method of injection, but full particulars will probably be made known shortly.

HARD MILKERS.

J.J.R., Square Top.—

The fact that a cow is a hard milker does not indicate that she is not a good milker, but because she is a hard milker she is often neglected at milking time by the milkers, who leave a large quantity in the udder which should have been drawn out. The trouble can easily be overcome by the use of a simple instrument called the "teat dilator," which has the same effect as the "teat plug." There is another instrument for the purpose called the "teat slitter," but our veterinary surgeon, Mr. Cory, does not recommend its use. The instruments mentioned can be obtained from Mr. C. Zoeller, surgical instrument maker, Brisbane.

SALTBUSH.

D. Finch, Preston.—Your inquiry *re* saltbush was referred to the Colonial Botanist, Mr. F. M. Bailey, who states that saltbush would grow in the Proserpine district—probably is already growing there. Seed can be obtained from most reliable seedsmen. Choose a wet time for planting or sowing.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	OCTOBER. Prices.
Apples (Hobart), per case	9s. to 10s.
Apples (Victorian), per case	12s. to 15s.
Apples (American), per case	19s to 20s.
Apples (Cooking), per case	9s. to 12s.
Bananas (Cavendish), per dozen	2½d. to 3d.
Bananas (Sugar), per dozen	2½d. to 3d.
Cape Gooseberries, per quarter-case	5s. 6d. to 7s. 6d.
Custard Apples, per quarter-case	5s. to 6s.
Lemons (Lisbon), per case	9s. to 10s.
Lemons (Sydney), per case	...
Mandarins, per quarter-case	...
Mangoes, per case	...
Oranges, per case	9s. to 10s.
Oranges (Local), per case	...
Papaw Apples, per quarter-case	1s. 3d. to 2s.
Passion Fruit, per quarter-case	5s. to 6s.
Pears, per case	...
Pears (Hobart), per case	...
Pears (Victorian), per case	...
Persimmons, per box	...
Pineapples (Ripley Queen), per dozen	5s. to 6s.
Pineapples (Rough), per dozen	2s. to 3s.
Pineapples (Queen), per dozen	2s. 6d. to 6s.
Rosellas, per sugar bag	...
Strawberries, per tray	1s. to 1s. 6d.
Tomatoes, per quarter-case	2s. 6d. to 4s.
Cherries	7s. to 9s.

SOUTHERN FRUIT MARKET.

Apples (Local), per gin case	...
Apples (Tasmanian), per bushel case	11s. to 12s.
Apples (Eating), per case	...
Apples (Cooking), per bushel case	12s.
Bananas (Fiji, G.M.), per case	19s.
Bananas (Fiji, G.M.), per bunch	5s. to 12s.
Bananas (Queensland), per dozen	nominal.
Cocoanuts, per dozen	2s. to 2s. 6d.
Lemons (Local), per gin case	3s. to 8s.
Lemons (Italian), per half-case	...
Mandarins (Emperor), per gin case	...
Mandarins (Medium), per gin case	...
Oranges (Local), per gin case	9s. to 10s.
Oranges (Navel), per case	...
Passion Fruit, per half-case	5s.
Peanuts, per lb.	...
Pears (Victorian, Josephine), Choice, per packer	...
Pears (Medium), Choice, per packer	...
Persimmons, per box	...
Pineapples (Queensland), Ripley Queen, per case	10s. to 11s.
Pineapples (Queensland), Choice, Common, per case	7s. to 10s.
Pineapples (Queensland), Choice, Queen, per case	...
Quinces, per gin case	...
Tomatoes (Queensland), per quarter-case	3s. 6d. to 5s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR OCTOBER.

Article.		OCTOBER. Prices.
Bacon, Pineapple	lb.	6½d. to 9½d.
Barley, Malting	bush.	3s. 6d.
Bran	ton	£5 2s. 6d.
Butter, Factory	cwt.	...
Chaff, Mixed	ton	£3 15s. to £4 10s.
Chaff, Oaten	"	£5 5s.
Chaff, Lucerne	"	£3 5s. to £4 15s.
Chaff, Wheaten (Straw)	"	£2 to £2 10s.
Cheese	lb.	5½d. to 1s.
Flour	ton	...
Hay, Oaten	"	£5 5s. to £5 10s.
Hay, Lucerne	"	£3 to £3 15s.
Honey	lb.	2½d.
Maize	bush.	4s.
Oats	"	3s. 1d. to 3s. 2d.
Pollard	ton	£6
Potatoes	"	£4 to £7 5s.
Potatoes, Sweet	"	£2 10s.
Pumpkins	"	£3 to £4.
Pumpkins (Cattle)	"	£1 10s.
Wheat, Milling	bush.	4s. 6d. to 4s. 9d.
Wheat, Chick	"	...
Onions	ton	£5 to £11.
Hams	lb.	10½d. to 1s. 1½d.
Eggs	doz.	6¾d. to 9d.
Fowls	pair	3s. 3d. to 5s.
Geese	"	6s. to 6s. 6d.
Ducks, English	"	4s. to 4s. 6d.
Ducks, Muscovy	"	5s. 2d. to 6s.
Turkeys (Hens)	"	9s. to 10s. 6d.
Turkeys (Gobblers)	"	17s. to 22s.

ENOGGERA SALEYARDS.

Animal.	OCTOBER. Prices.
Bullocks	£8 to £9 5s.
" (single)	£12 5s.
Cows	£6 to £7 12s. 6d.
Merino Wethers (Woolly)	16s. 6d.
Crossbred Wethers	17s. 9d.
Merino Ewes	12s.
Crossbred Ewes	14s. 9d.
Lambs	12s. 9d.

Orchard Notes for January.

By Albert H. Benson, M.R.A.C.

THE SOUTHERN COAST DISTRICTS.

The fruit of the month in this part of the State is the grape, and its gathering and marketing will occupy the attention of growers. Care should be taken to cut the fruit when cool and dry, and if it has to be sent any distance the stems of the bunches should be allowed to wilt before the fruit is packed, as the berries will then hang on to the bunch better, and the bunch carry in better order. Select the fruit carefully, grade it, and pack firmly so that it will not bruise in transit. If to be sent long distances, pack in crates holding from four to six 6-lb. baskets. Pines will be ripening in quantity towards the end of the month. Gather before fully coloured, and, whether for Southern or local markets, pack and handle carefully to prevent bruising. Do not ship the fruit too green for the Southern markets, as doing so is apt to spoil the trade. Send good fruit to the canneries. Small pines and crippled fruit are no good to canners, and the sooner our growers realise that it only pays to grow good fruit the better for them and for the canners, as if the latter cannot get good fruit it is impossible for them to put a line of goods that will not only be a credit to the State, but for which a world-wide market can be obtained.

Passion fruit should not be allowed to lie about for days on the ground before gathering, as if so they are apt to become fly-infected.

Water melons and rock melons are still in season.

Watch any late peaches, Japanese plums, or other fruits liable to be infected with fruit fly, and gather and destroy all infected fruit, or, better still, grub the trees out and burn them, as they only breed flies to destroy more valuable fruit. Mangoes will be ripening during the month. See that all fly-infected fruits are destroyed, as they will only breed up further crops to destroy later ripening fruits.

Citrus orchards can be cyanided during the month for scale insects, and spraying for Maori with the sulphide of soda wash should be continued when necessary.

Mangoes can be budded during the month, as well as citrus and deciduous trees. Tropical fruit trees can be transplanted, taking care to choose dull weather and to cover same from the direct rays of the sun till they have become firmly established. Pines and bananas can still be planted.

TROPICAL COAST DISTRICTS.

See that all bananas are covered with netting, as the fly is usually at its worst at this time of year.

Mangoes will be going off; see that they are not allowed to remain about on the ground to breed flies for the autumn crop of oranges. Longan, litchi, and other fruit are in season. As the month is often a very wet one, little cultivation can be done in the orchards. Strong undergrowth should, however, be kept down with a hoe or scythe. Tropical fruits of all sorts can be planted. Look out for Maori or citrus fruits, and spray when necessary.

SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Stanthorpe district, apples, pears, plums, peaches, and nectarines being in season. Do not gather the fruit too immature; at the same time do not allow it to be over-ripe. Gather dry, handle carefully, grade and pack in attractive cases. Keep the fruit as cool as possible, and ship in well-ventilated cars. Keep a sharp lookout for fruit fly, and take every possible means to prevent its spreading, even going as far as to gather and destroy the whole of the fruit on any infected trees, as if kept in check during the month the bulk of the fruit ripening during February will be free.

Keep a sharp lookout also for codling moth, examine the bandages on the trees at least every ten days, and destroy all larvæ found therein, also gather and destroy all moth-infected fruit.

Gather Bartlett pears as soon as they are large enough, and store away in a cool shed to ripen; when they show signs of ripening, market, not before. If sent down green they will sell for cooking, and only fetch a small price. The right stage at which to gather is when the fruit is fully developed, and the flesh has lost its woody flavour but is still quite hard. This is usually before the fly has stung it, and if gathered at this stage the fruit will ripen up properly without shrivelling and develop its full flavour.

These remarks apply also to the Downs country, which is somewhat earlier than Stanthorpe.

The crop of the month in the Western tablelands is the grape; and the remarks I have made respecting this fruit when grown in the Southern coast districts apply equally here. The fruit should be gathered dry, and wilted before it is packed. Too large cases are often used, cases holding from 20 to 30 lb., or crates holding six 6-lb. baskets are preferable; the latter being the best package for shipping the fruit long distances. Keep the orchards well cultivated, and, where water for irrigation is available, give citrus trees a watering during the month unless there has been a sufficient rainfall. When the orchard is irrigated, see that thorough cultivation follows the irrigation so as to conserve the moisture in the soil.

Red Scale, which is prevalent on citrus trees in the dry Western country, should be treated during the month. Cyaniding is the best remedy.

Farm and Garden Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes, to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole.

KITCHEN GARDEN.—A first sowing of cabbages, cauliflowers, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflowers, mustard, cabbage, celery, radish, for autumn and winter use. Sow celery in shallow, well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying, also garlic, onions, and eschalots as the tops die down.

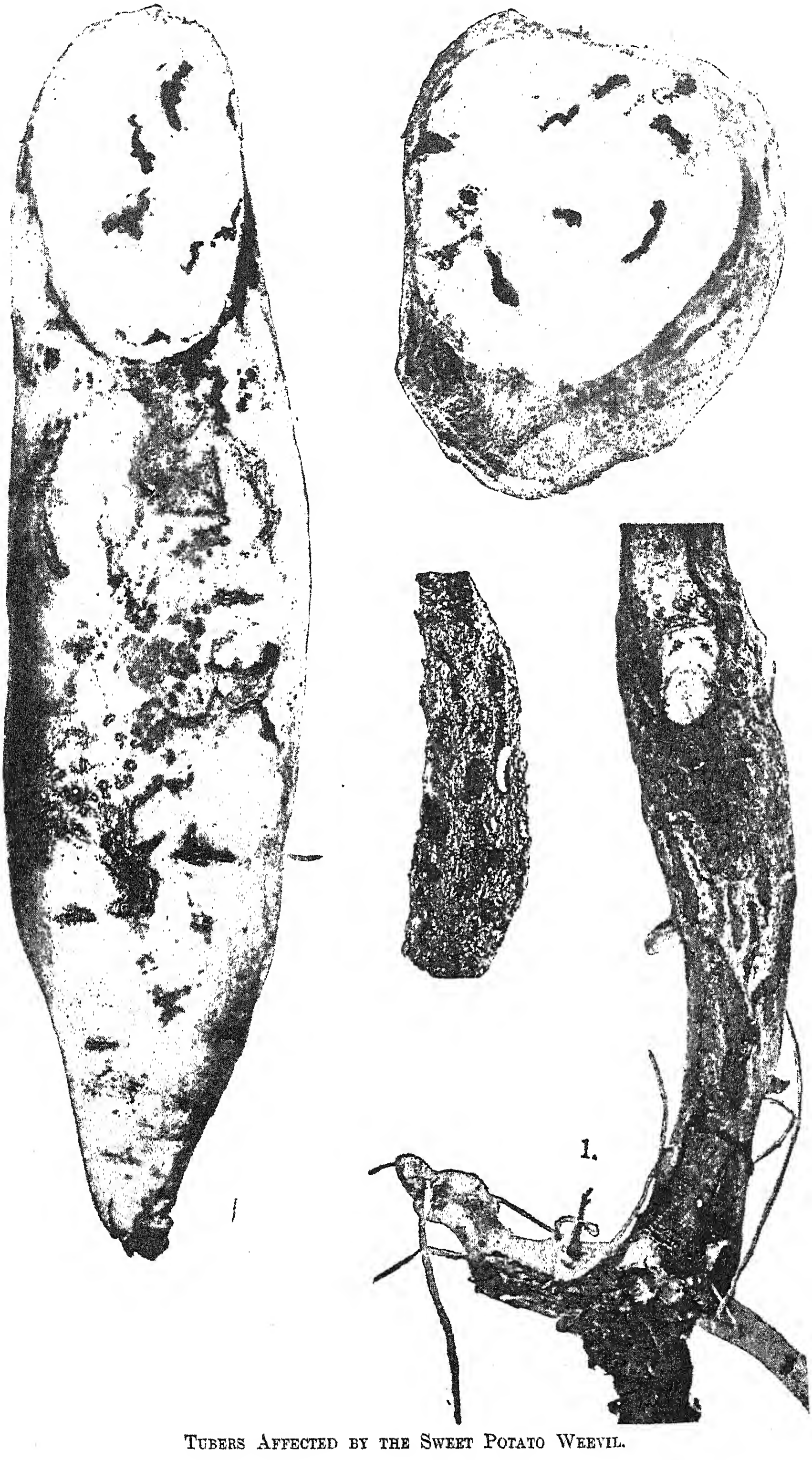
FLOWER GARDEN.—To make the flower beds gay and attractive during the Autumn and Winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost, then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle lift them gently one by one, with a knife or a zinc label—*never pull them up by hand,* as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf

mould. Then keep a sharp lookout for slugs and caterpillars. Keep a supply of tobacco dust on hand, and scatter this in the path of the slug and he will cease from troubling you.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over water at this season. Propagate verbenas, not forgetting to include the large scarlet Foxhunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work. The flower garden in Autumn and Winter will present a charming sight, and will afford light and profitable work for girls with spare time on their hands.

An exhaustive booklet on "Flower Gardening for Amateurs" has just been issued by the Department of Agriculture and Stock, and may be obtained from the office. Price, 2s.

Plate I.

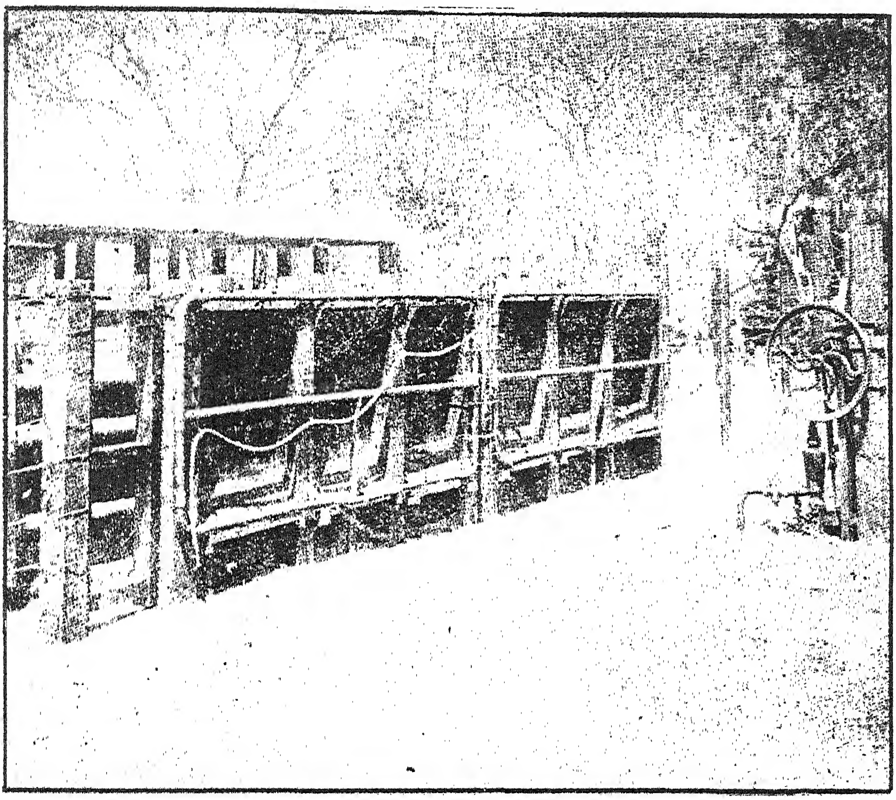


Tubers Affected by the Sweet Potato Weevil.

Plate II.

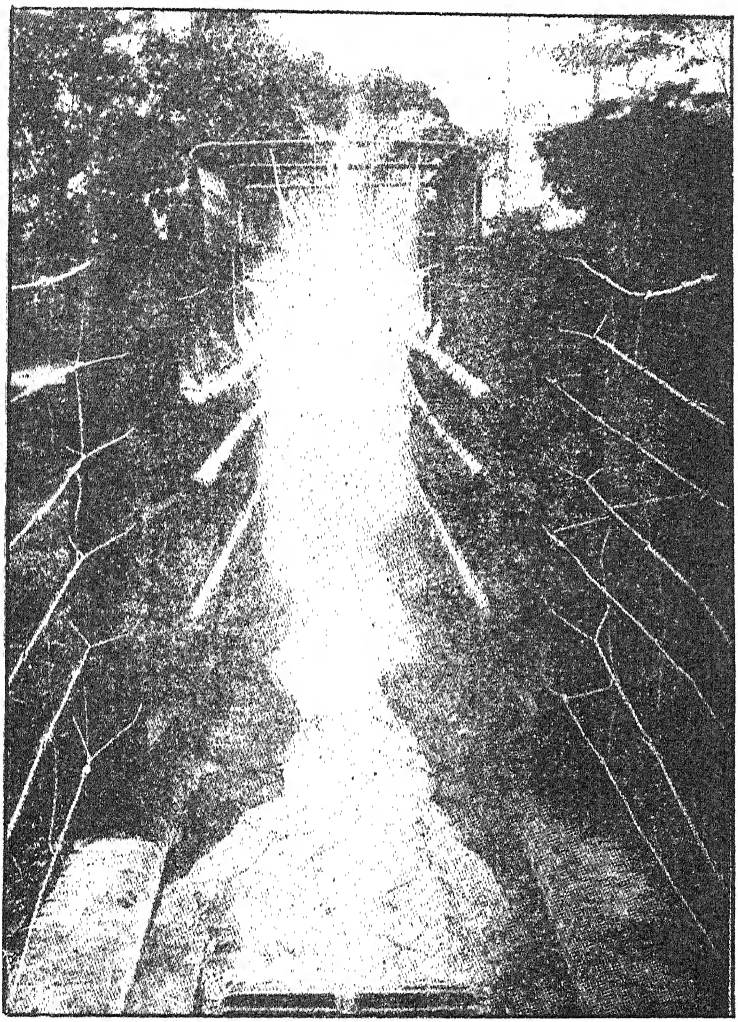
Wheat Championship Trophy.

Plate III.



SPRAY-PEN, TO HOLD TWO BEASTS.

Plate IV.

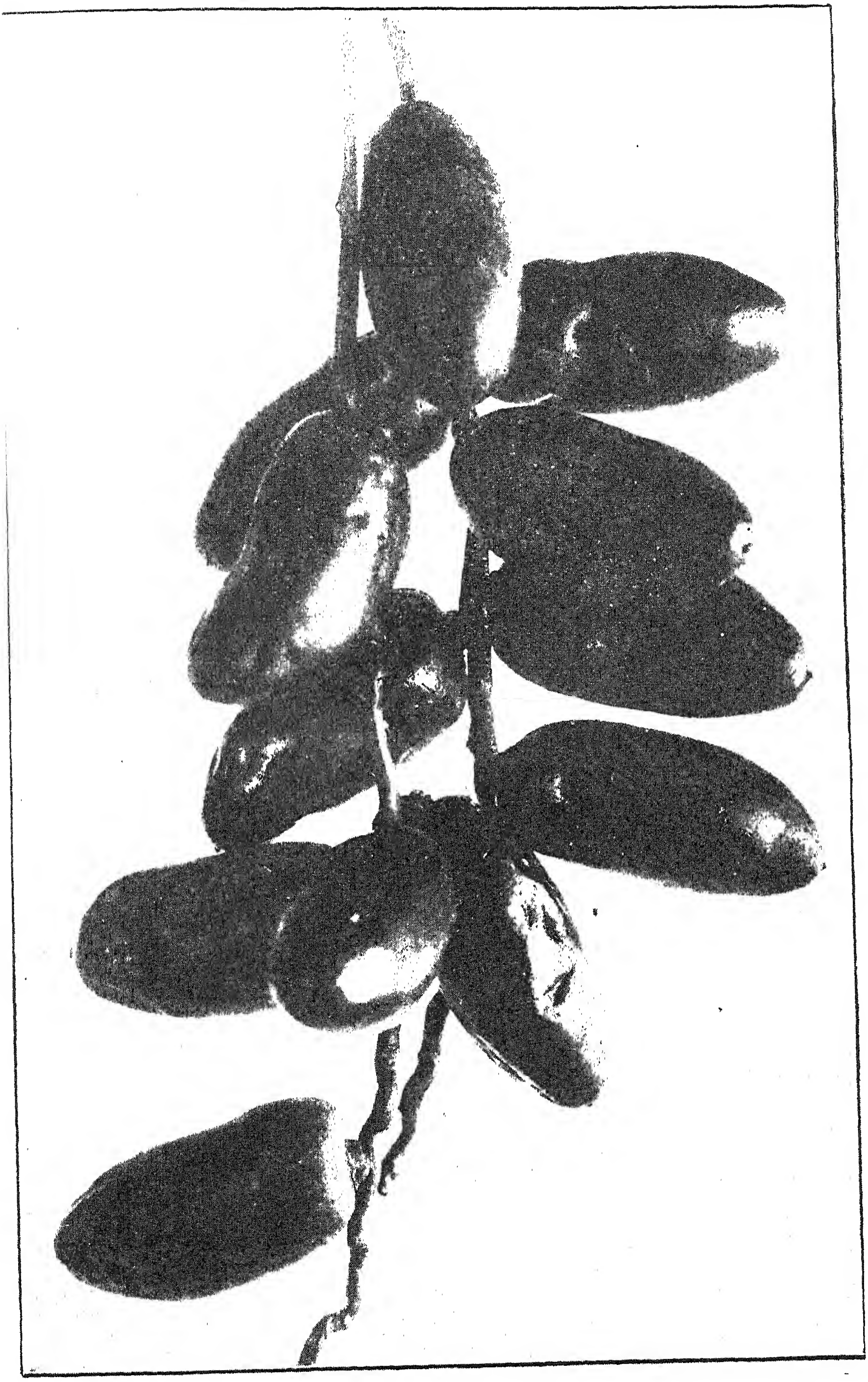


Spray-pen—Looking up the Pen.

Plate V.

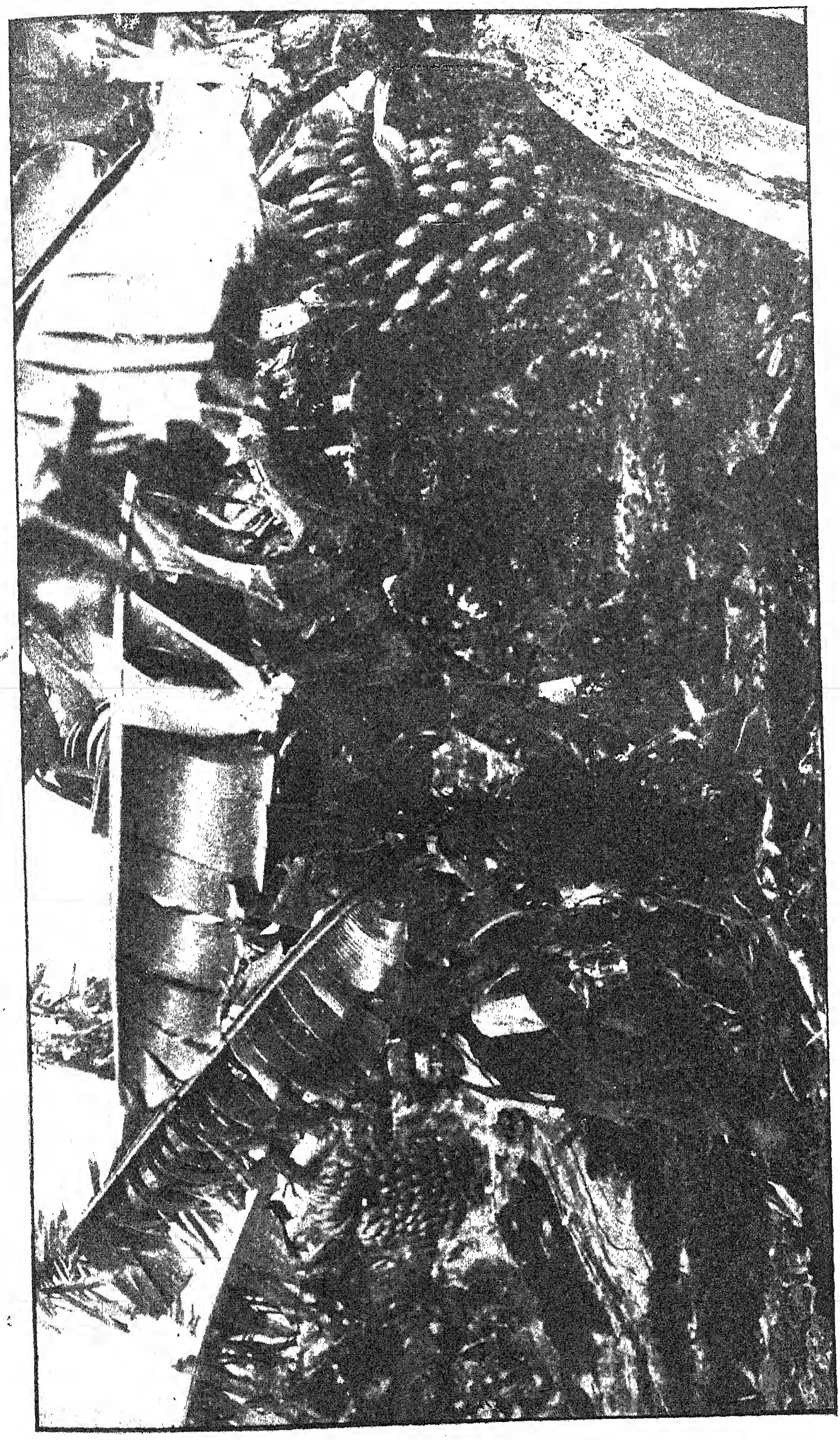
Spray-pen in Action.

Plate VI.



DATES GROWN BY MR. W. C. WILSON AT MIVA.

Plate VII.

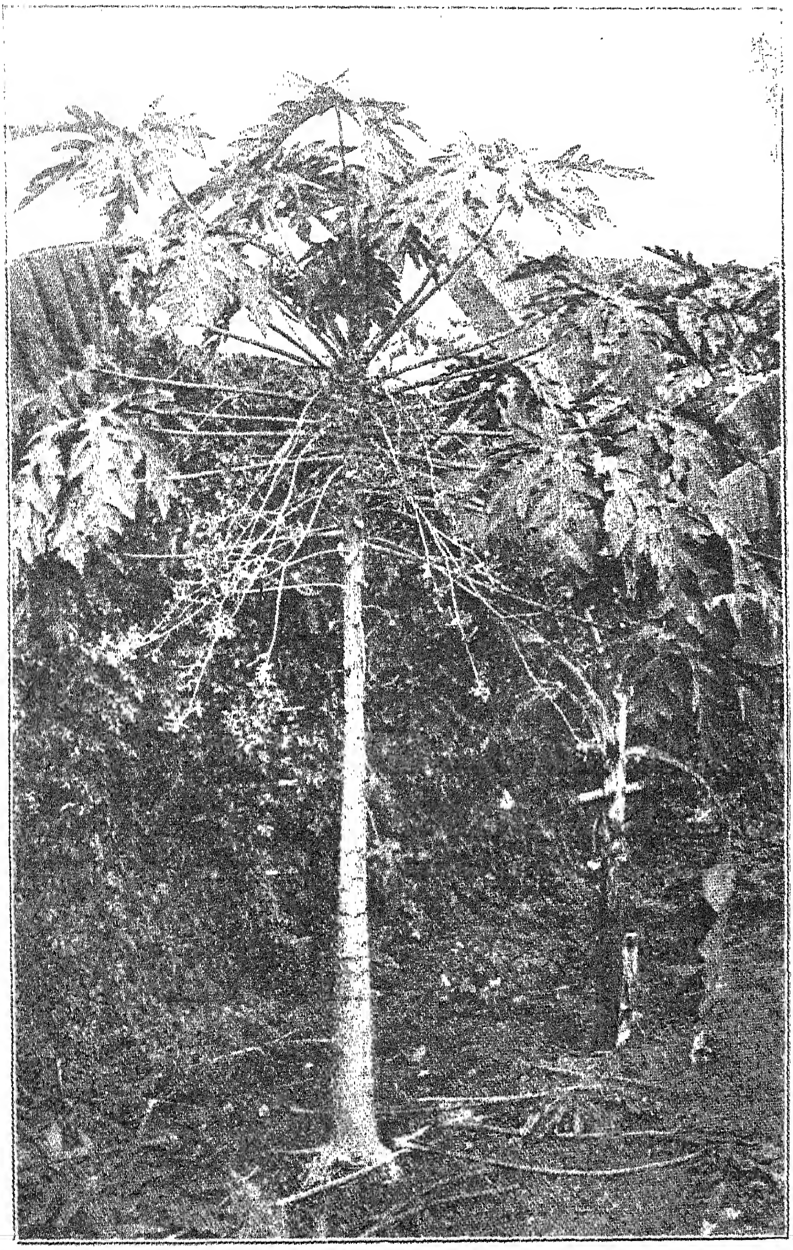


Cavendish Bananas on Scrub Land, Buderim Mountain.

Plate VIII.

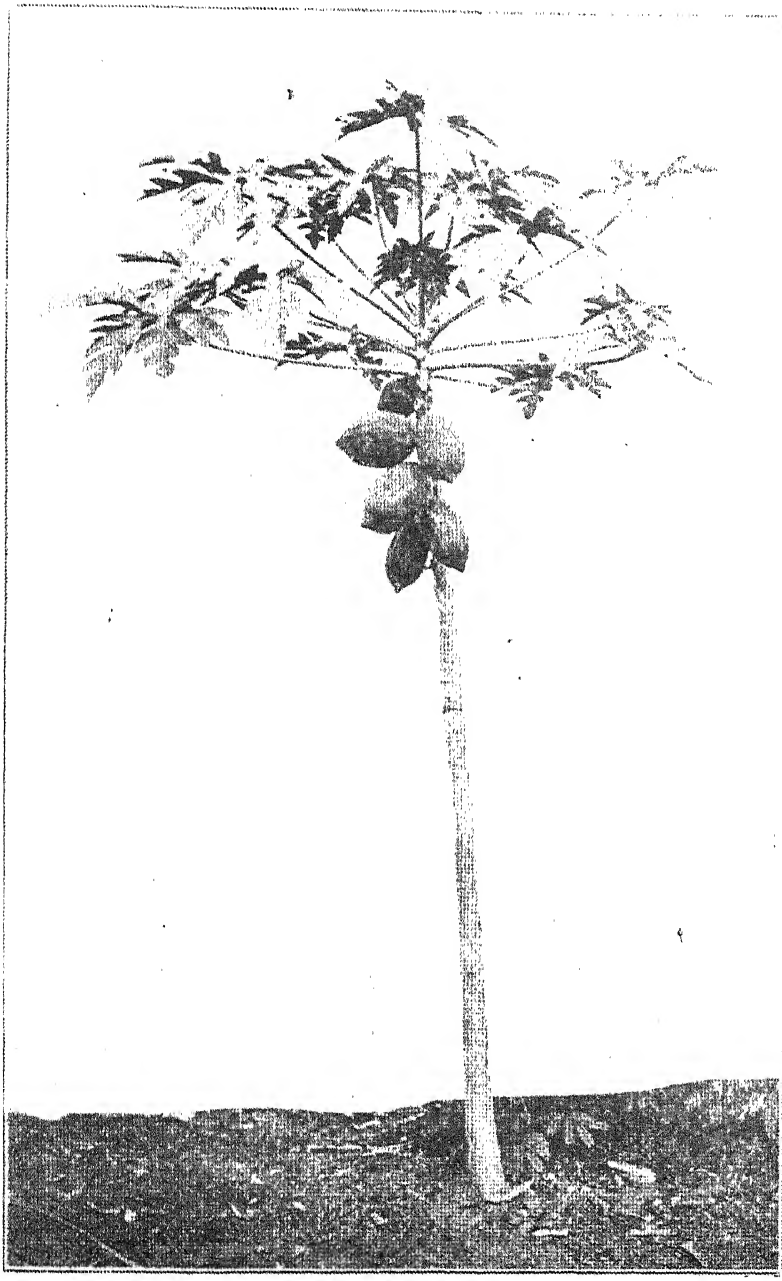
CAVENDISH BANANAS, SHOWING UNCLAIMED LAND IN THE BACKGROUND.

Plate IX.



Carica Papaya, Male Tree in Blossom.

Plate X.



ROUND VARIETY OF PAPAW FROM HAWAIIAN SEED.

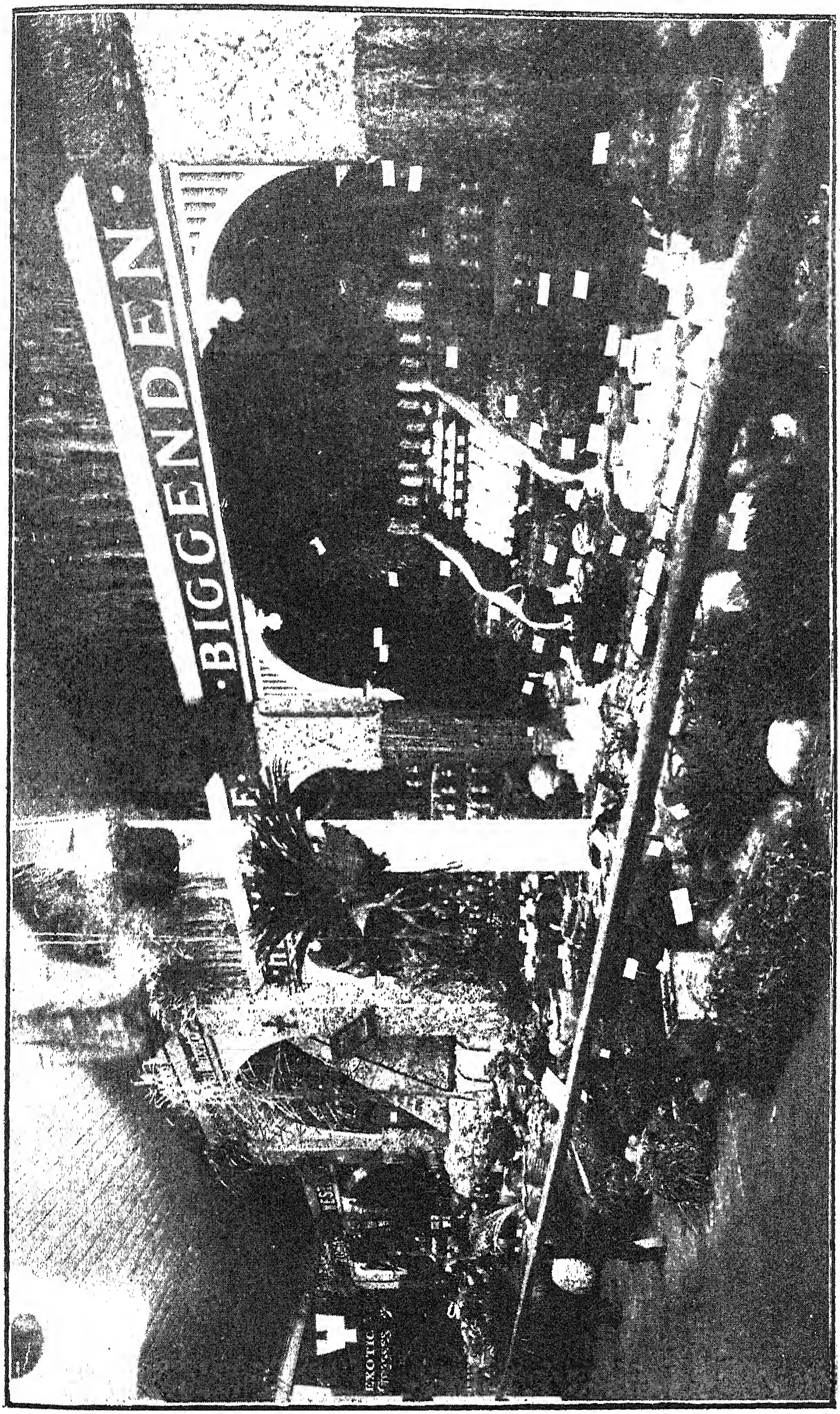
Plate XI.

Long Variety of Papaya from Singapore Seed.

Plate XII.

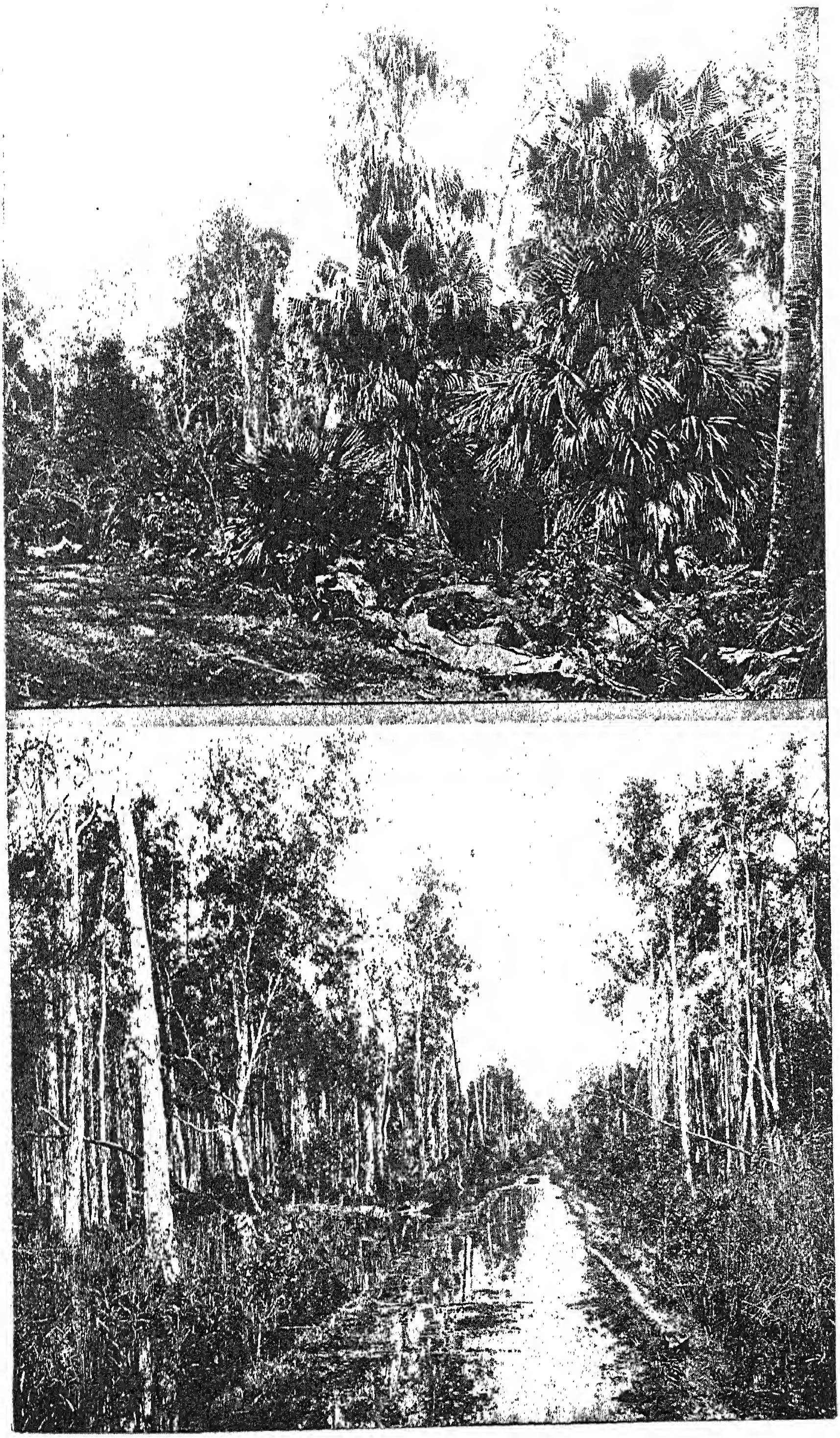
Male Papaw, Fruiting.

Plate XIII.



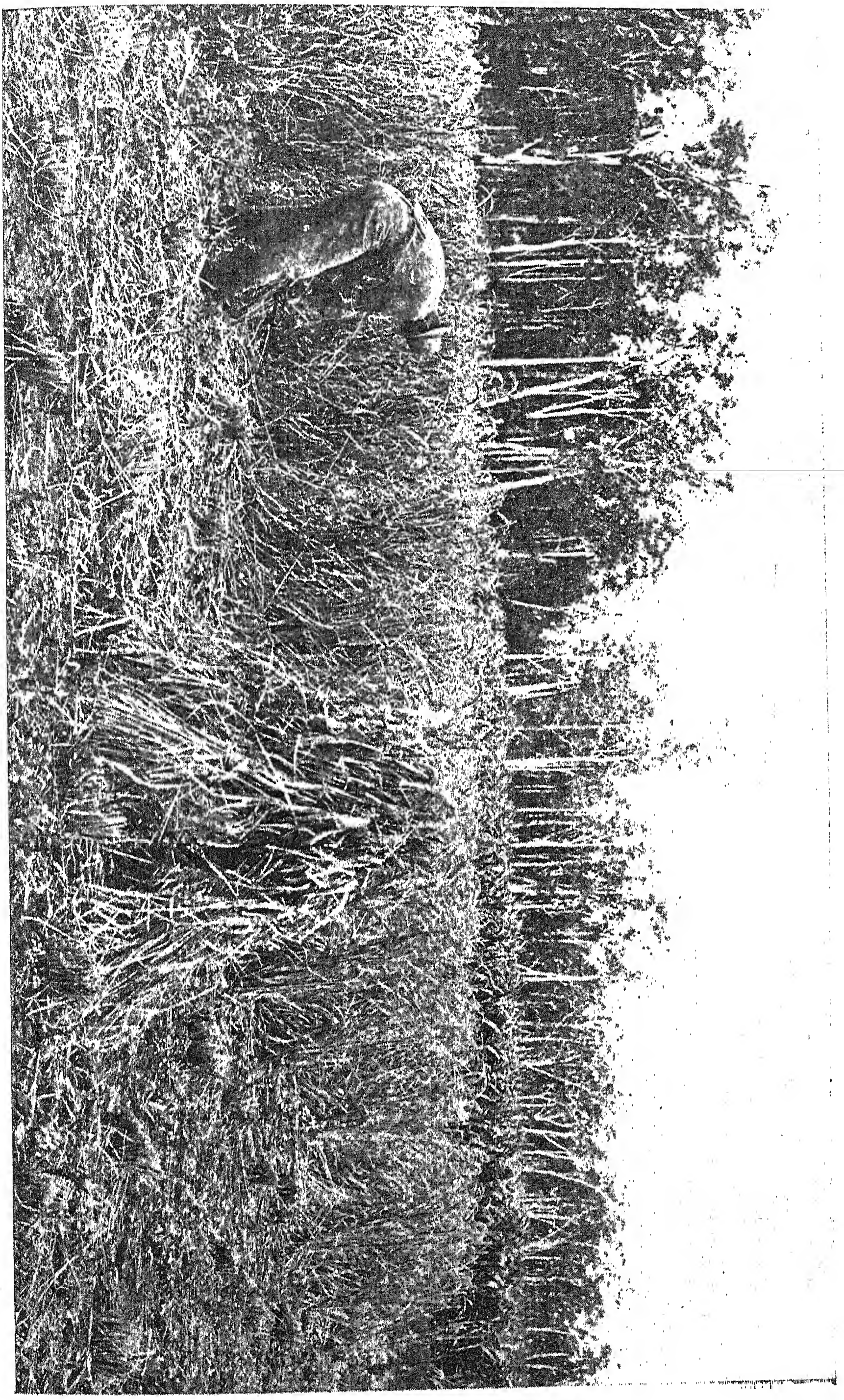
Portion of State Farm Exhibits Exhibited by Department of Agriculture and Stock, Bowen Park, 1909.

Plate XIV.



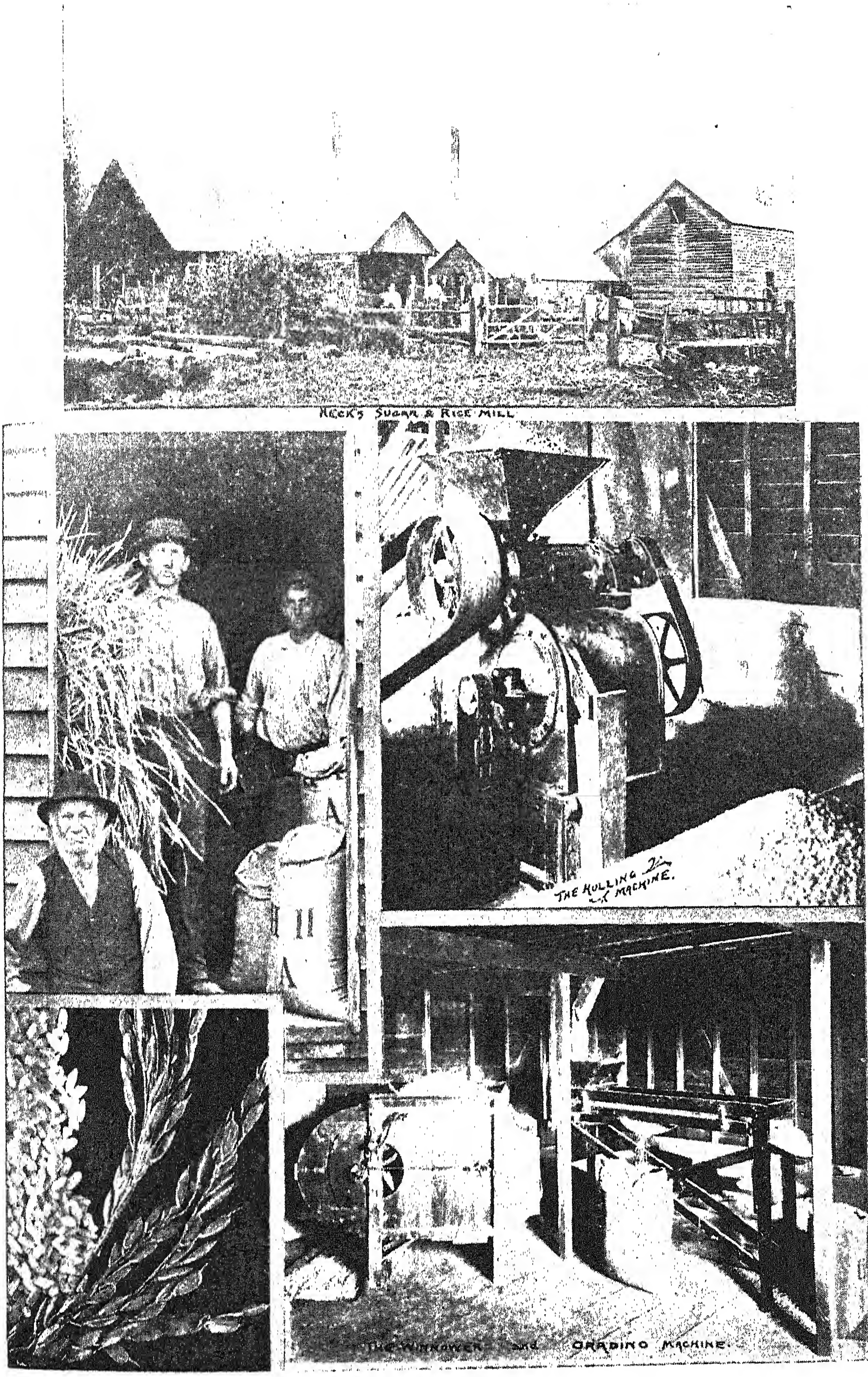
Rice Country

Plate XV.



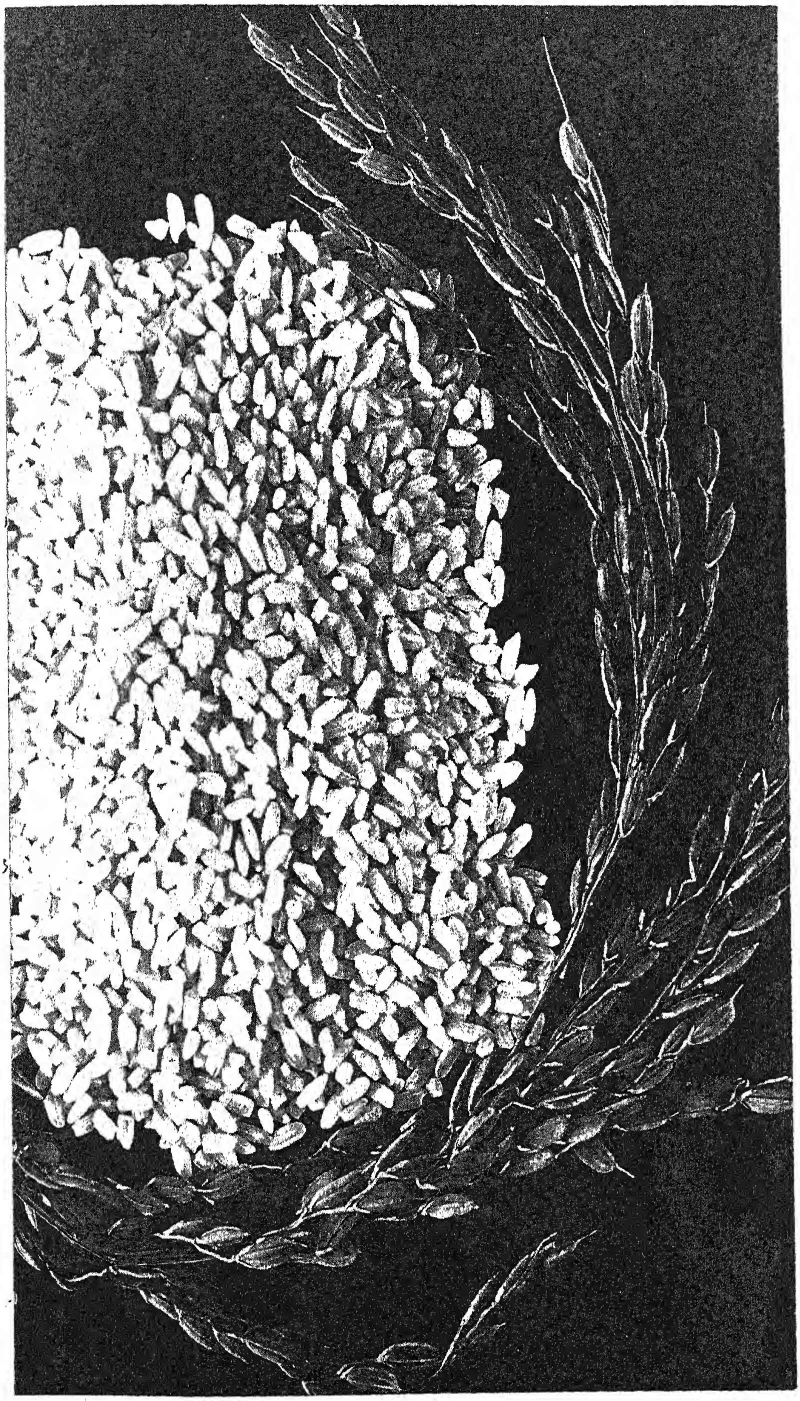
Harvesting Rice.

Plate XVI.



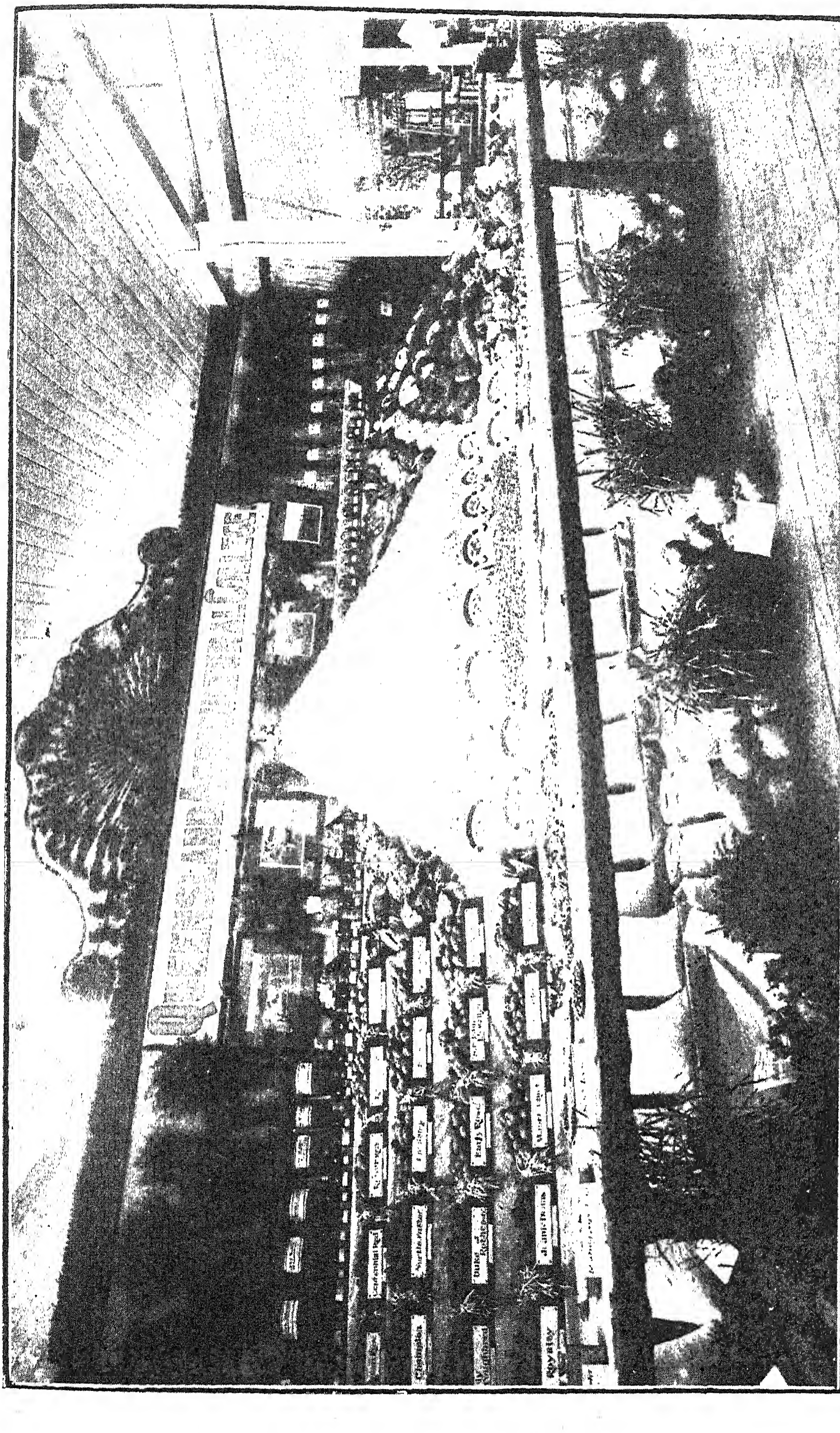
Rice Mill, Pimpama Island.

Plate XVII.



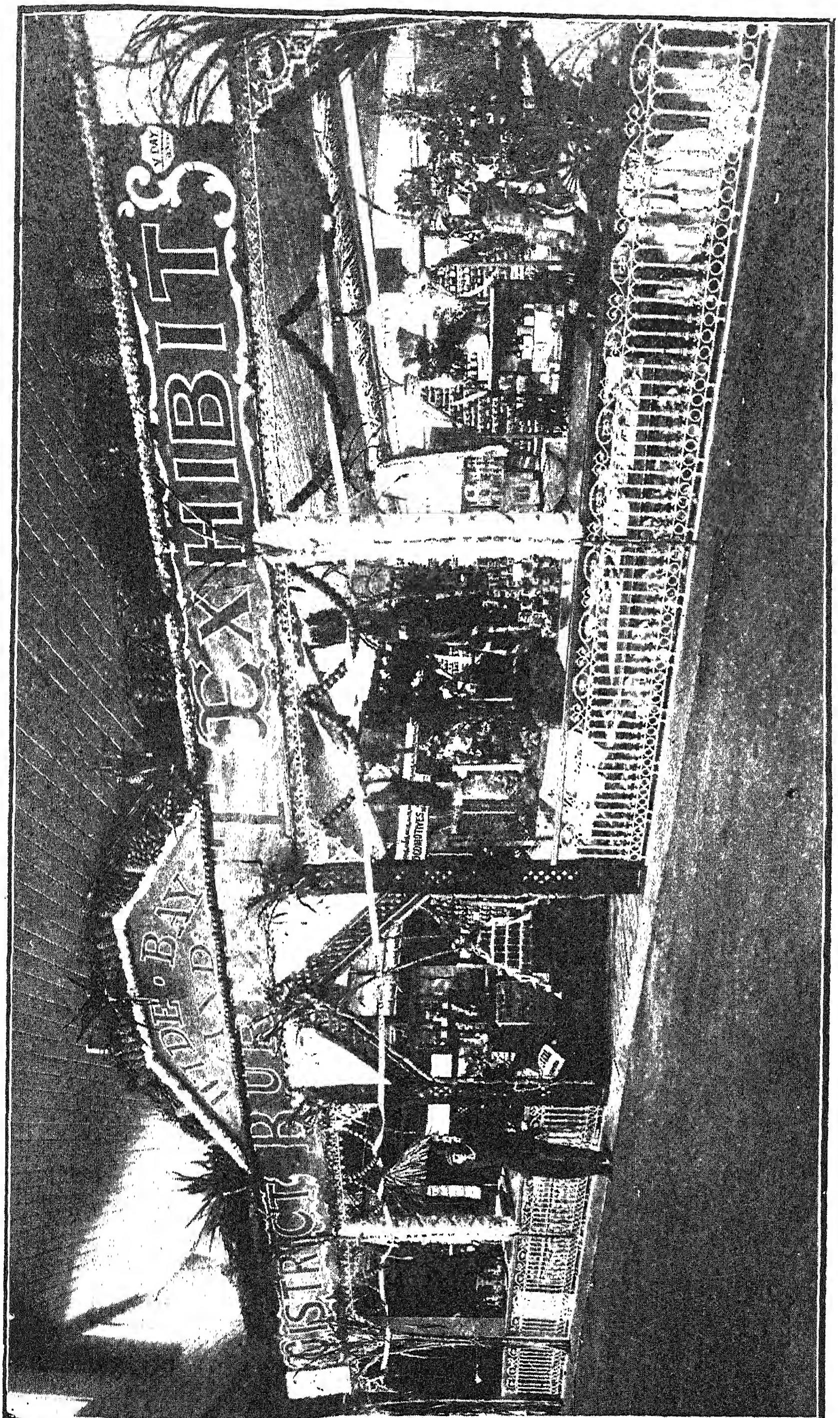
Head of Rice and Hulled Rice. (Natural Size.)

Plate XVIII.



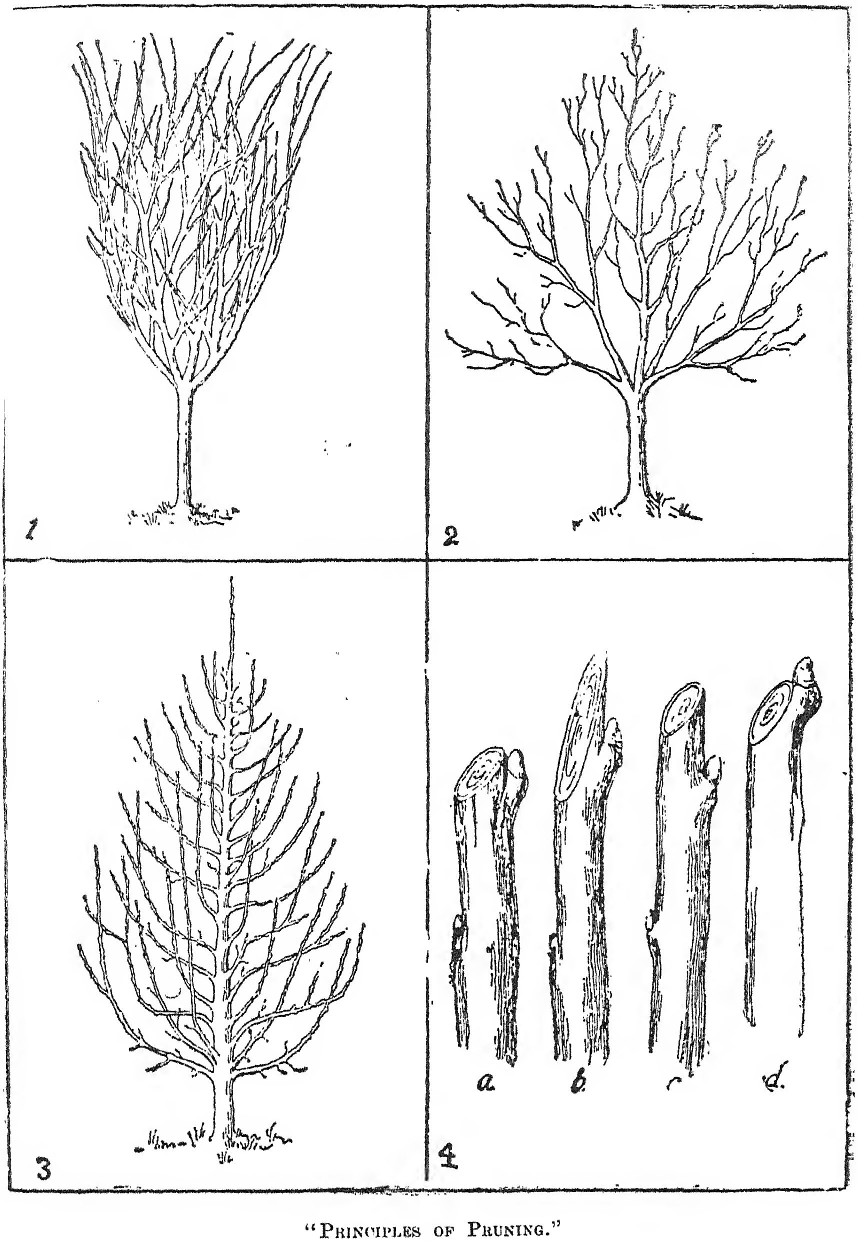
Portion of Queensland Agricultural College Exhibit, Bowen Park, 1909.

Plate XIX.



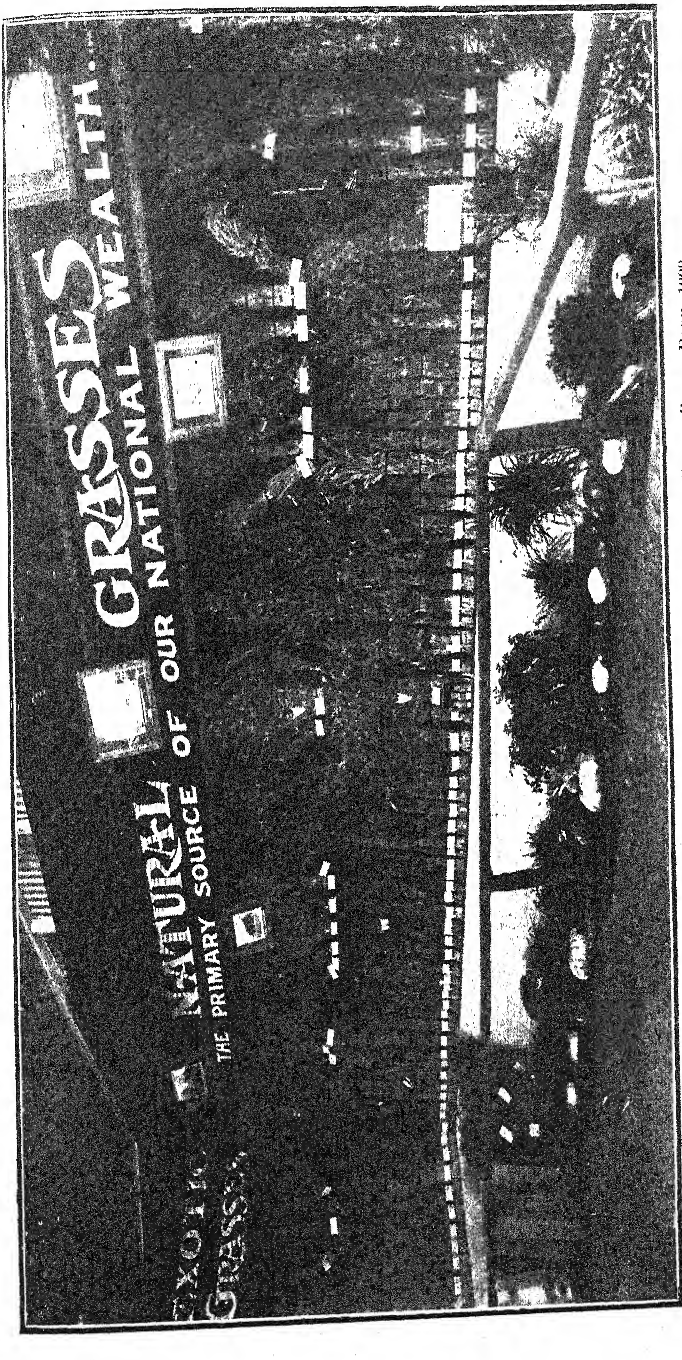
Wide Bay and Burnett, Winner of District Exhibit, Bowen Park, 1909.

Plate XX.



"PRINCIPLES OF PRUNING."

Plate XXI.

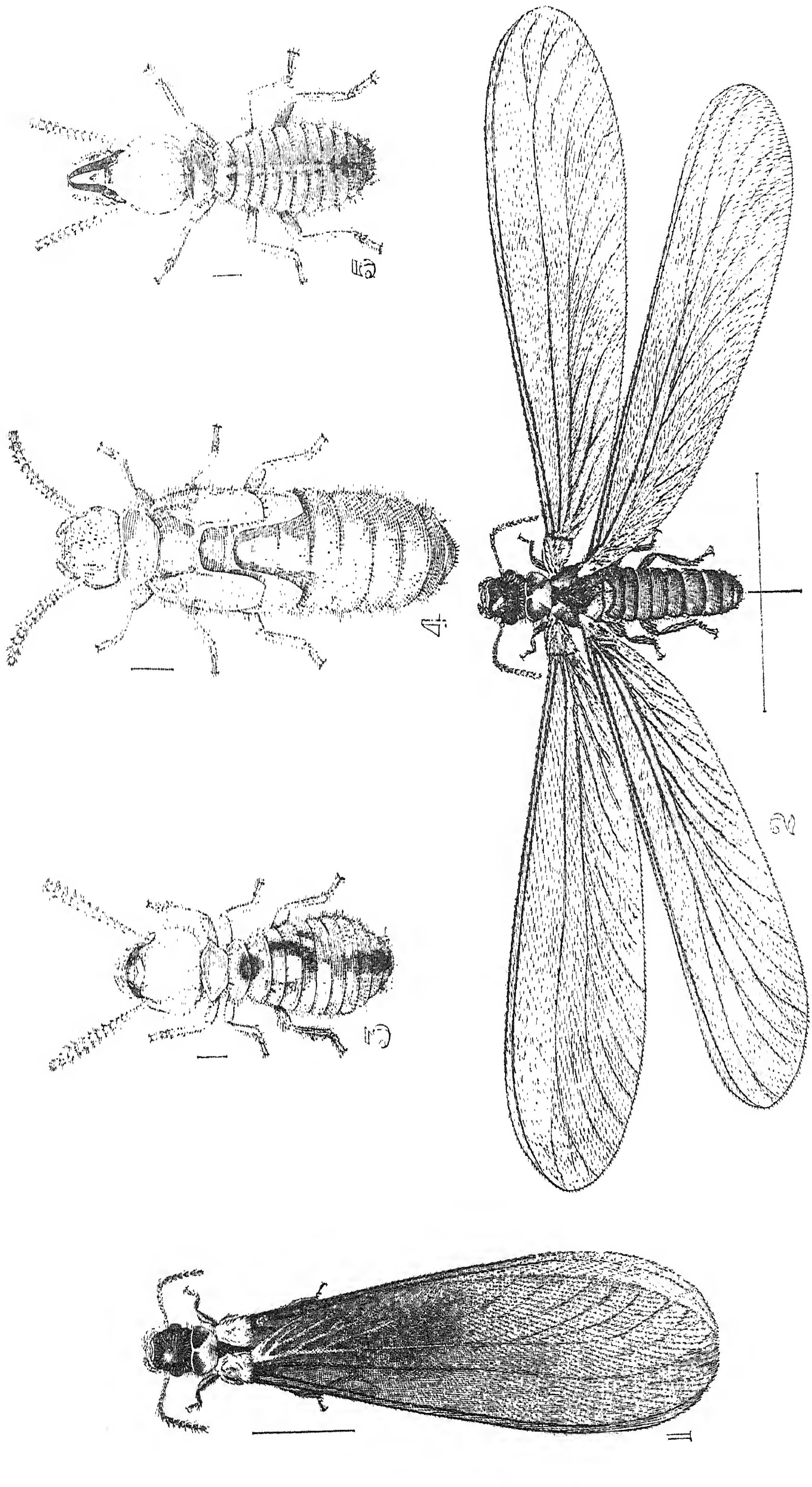


Natural Grasses Exhibited by Department of Agriculture and Stock, Bowen Park, 1909.

Plate XXII.

Tobacco Grown with Jadoo Fibre.

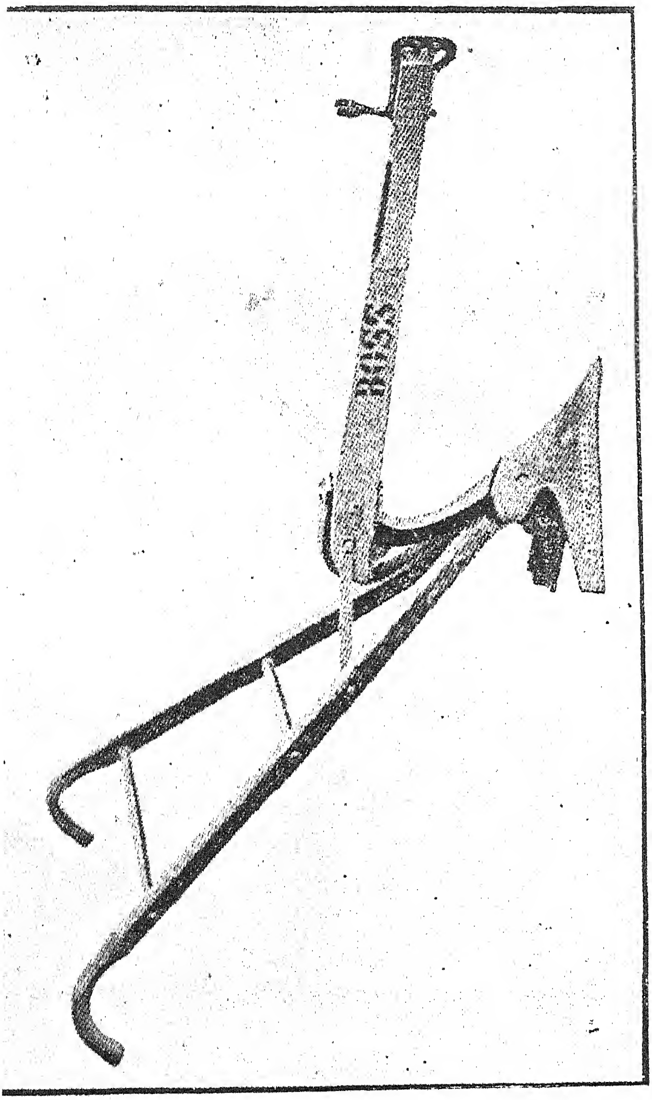
Plate XXIII.



White Ants.

1 and 2. Winged Male and Female. 3. Worker. 4. Nymph. 5. Soldier.

Plate XXIV.



EARTHNUT HARVESTER.

Plate XXV.

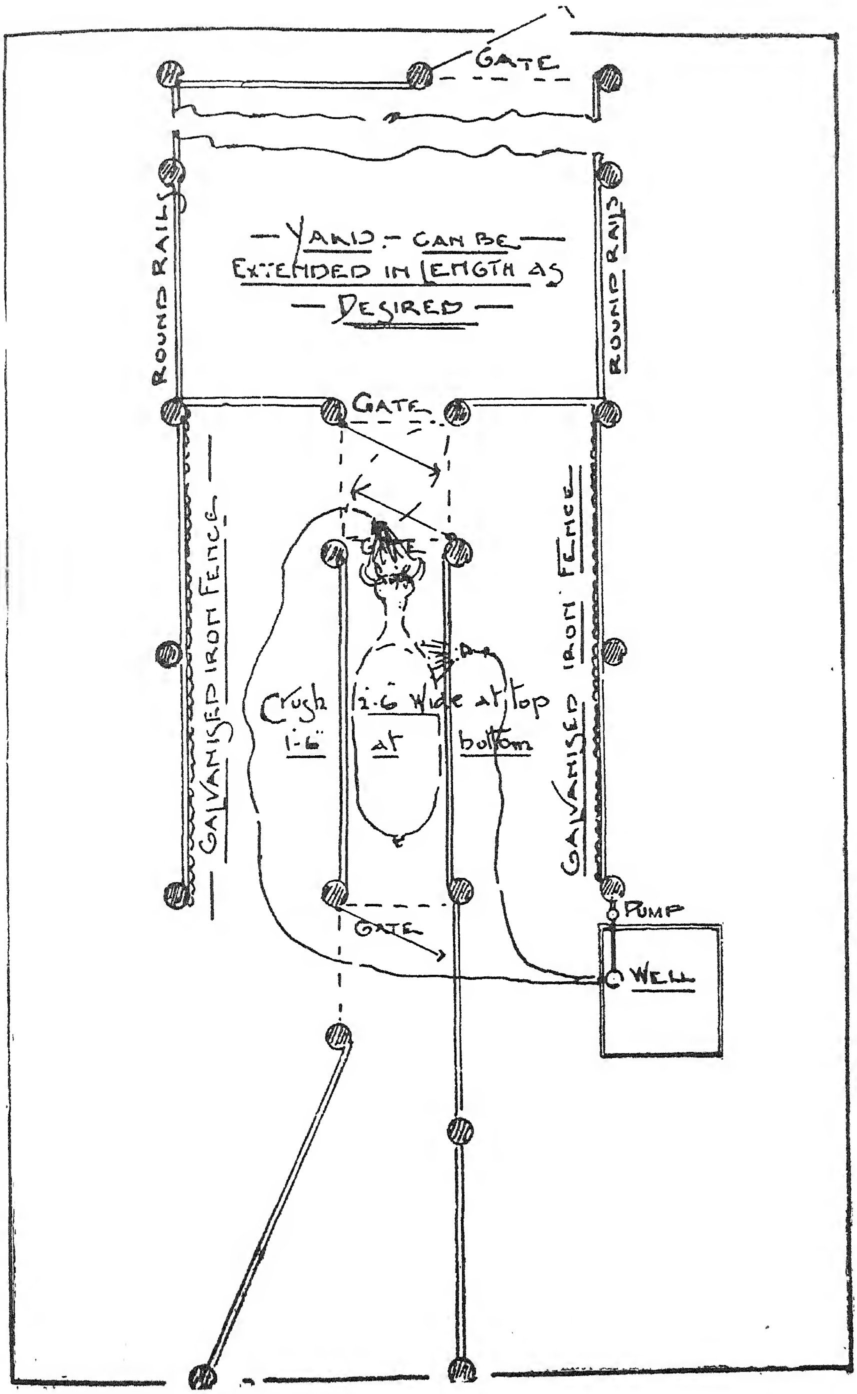
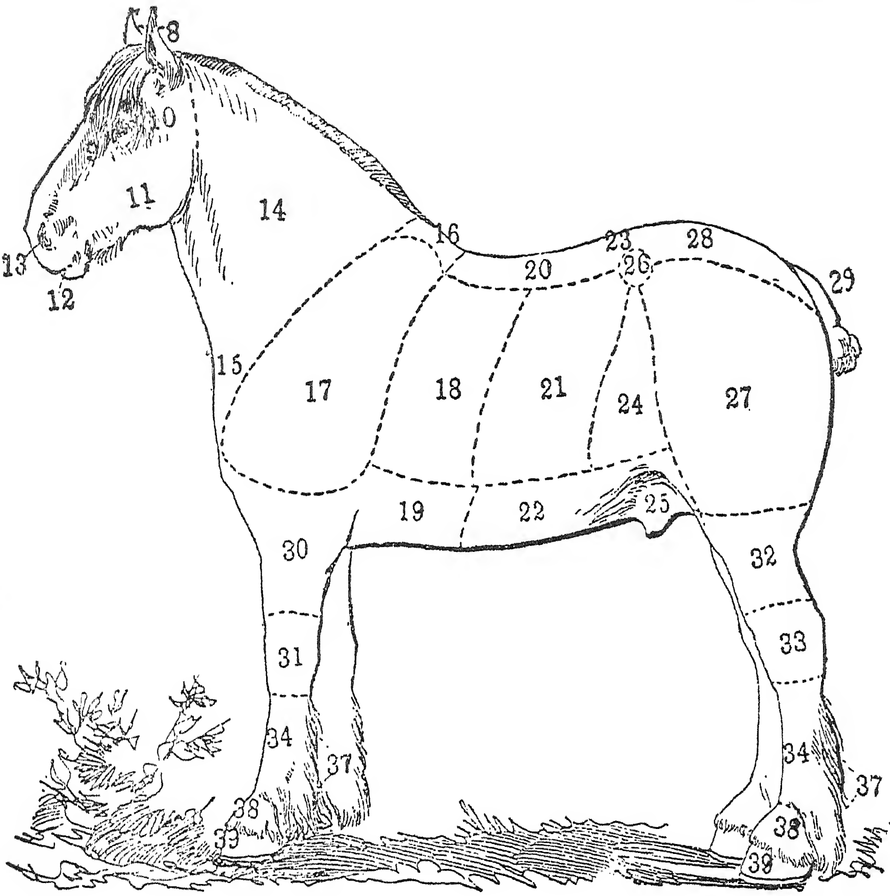
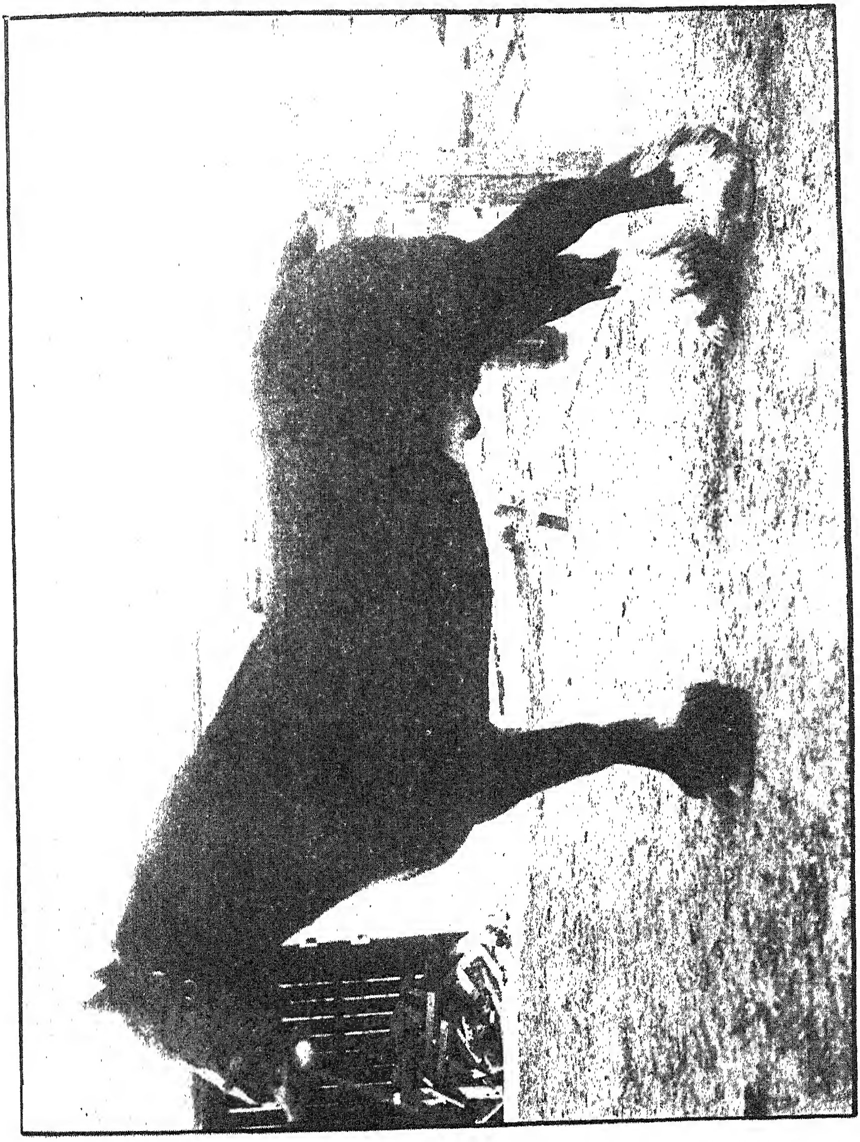

GATE
YARD - CAN BE EXTENDED IN LENGTH AS DESIRED
ROUND RAILS
ROUND RAILS
GATE
GALVANISED IRON FENCE
GALVANISED IRON FENCE
Crush 1·6 wide at top 1·6" at bottom
GATE
PUMP
WELL

Plate XXVI.



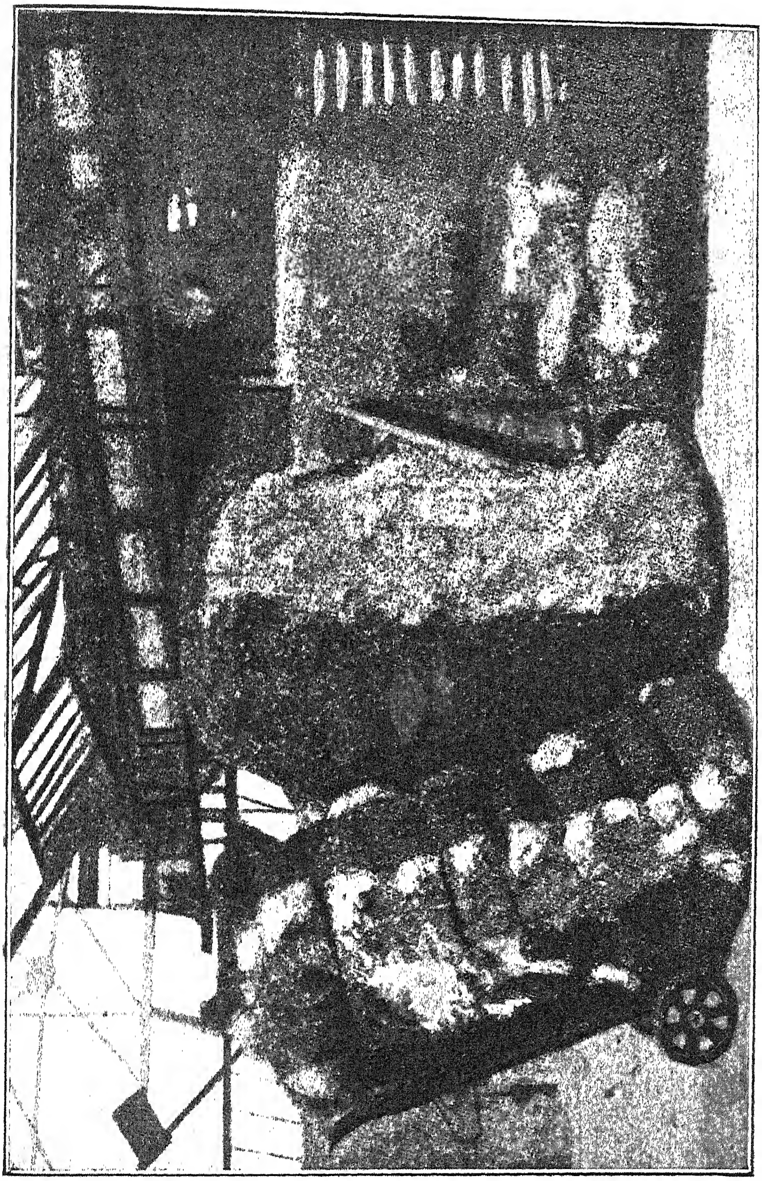
The above Plate represents a Clydesdale Heavy Draught Entire, with the points approximately indicated upon the Plate, the numbers appearing on it corresponding with those given in describing the points, and in setting out their relative values.

Plate XXVII.



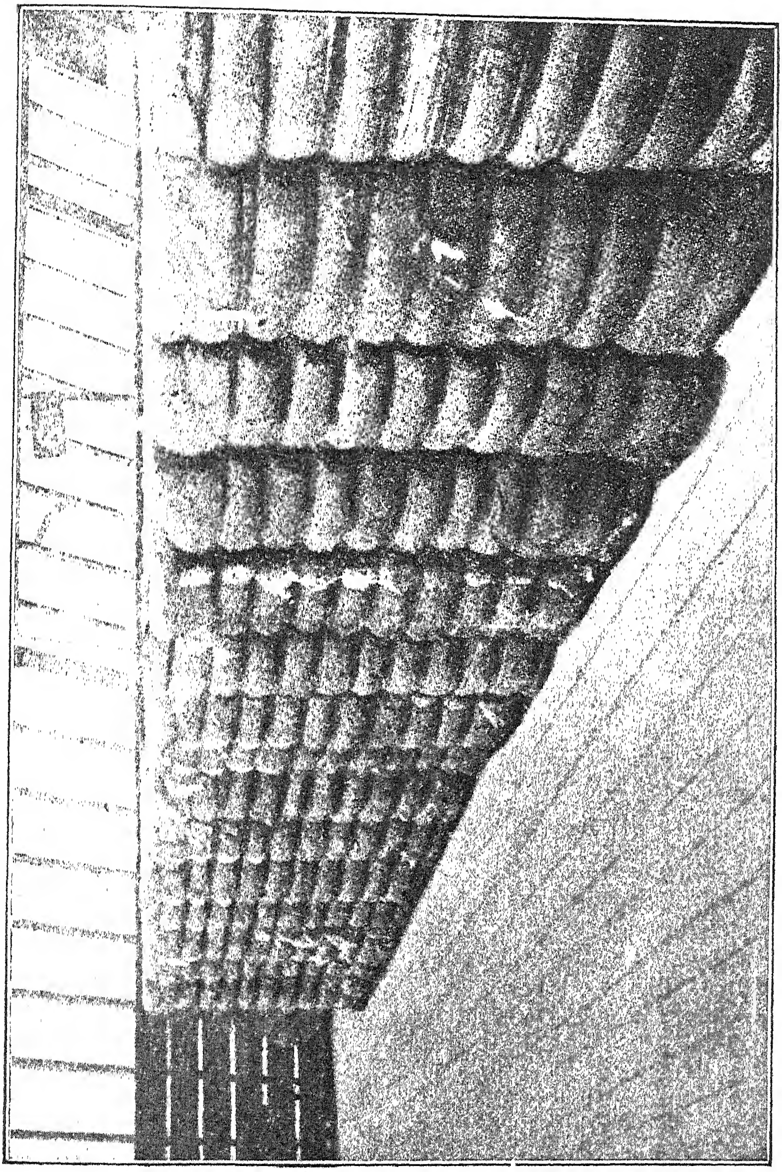
Clydesdale Stallion, King Edward VII.

Plate XXVIII.



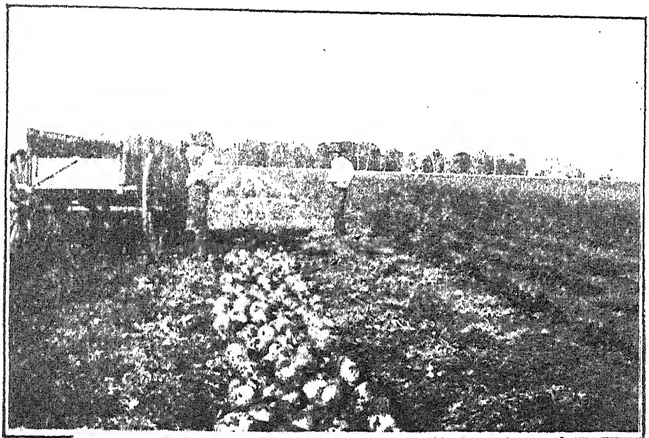
Cotton Baling, 1.—How the American Article Arrives in England.

Plate XXIX.



COTTON BALING, II.—HOW THE EGYPTIAN ARTICLE ARRIVES IN ENGLAND.

Plate XXX.



Mangolds at the Queensland Agricultural College.
Shorthorn Cow Lady Kelso.

Plate XXXI.

Eucalyptus Stoneana, *Bail.*

Plate XXXII.

Eucalyptus Stoneana, *Bail.*